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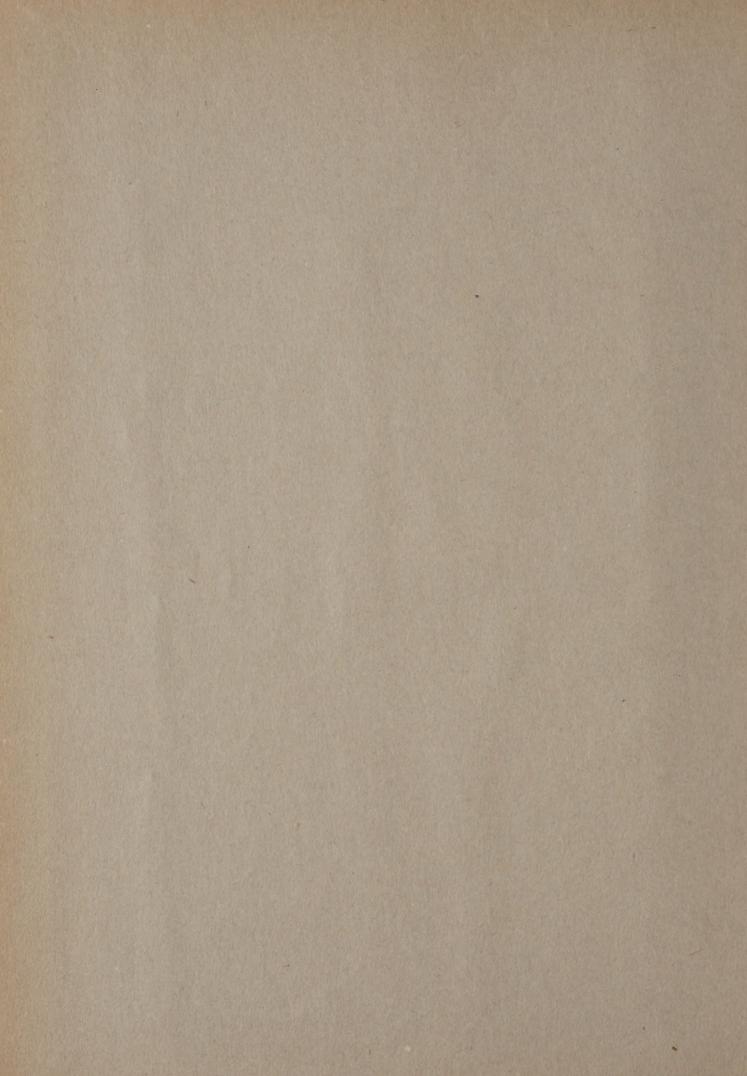
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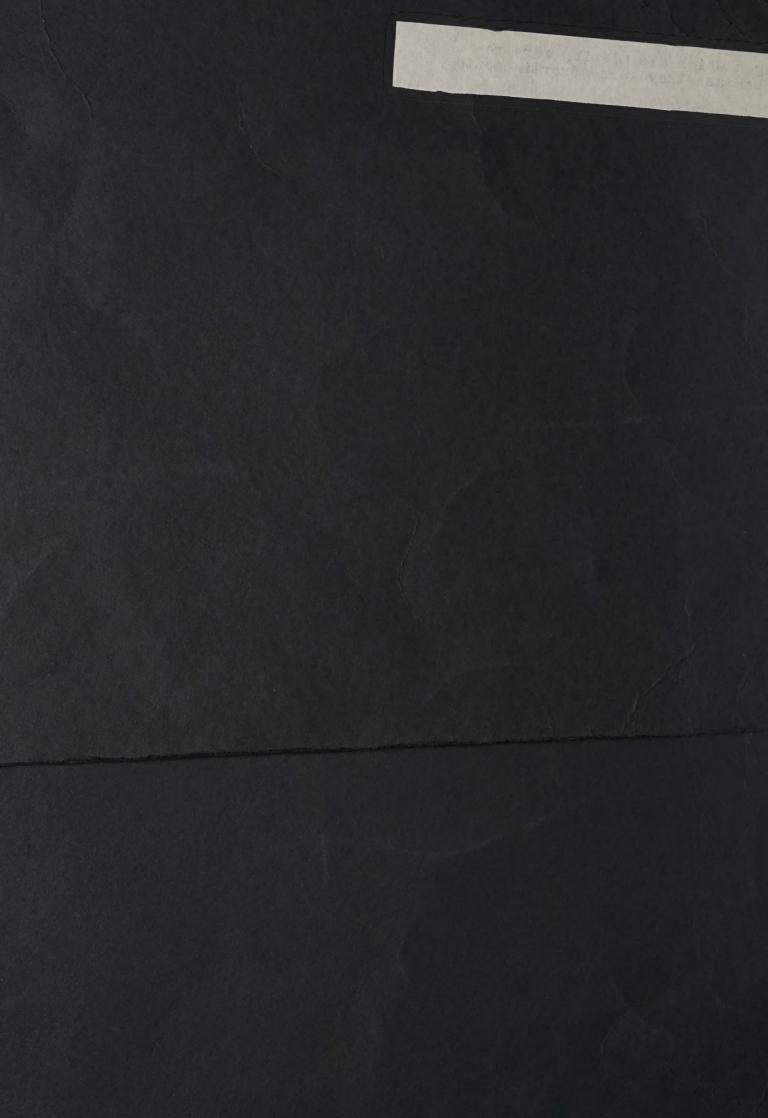
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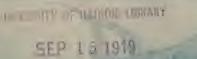
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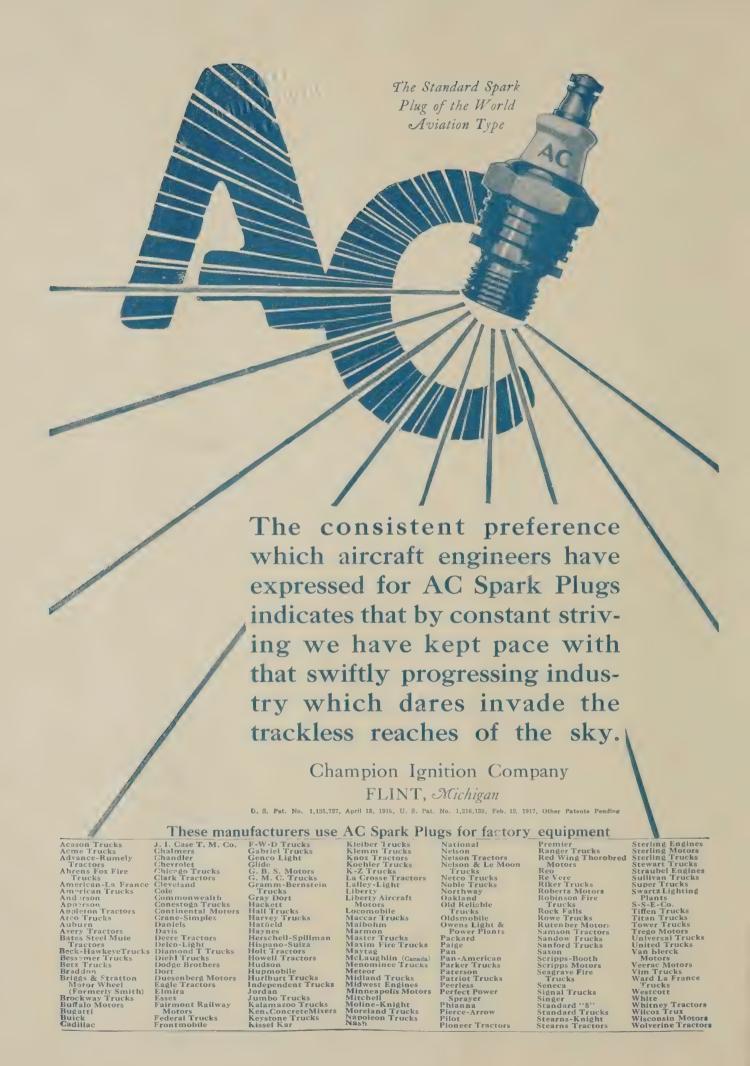
**SEPTEMBER 15, 1919** 

10 CENTS A COPY



Liberty and Safety-Major Ord Lees Making a Parachute Jump from a Flying Boat

First Trans-Continental Aerial Derby To Be Most Extensive Contest Ever Held



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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., September 15, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, SEPTEMBER 15, 1919

NO. 27

# THRILLING SPORT OF BALLOONING REVIVED

MR. ALAN R. HAWLEY, Chairman of the Contest Committee of the Aero Club of America, announces that fourteen entries have already been received for the National Balloon Race for 1919, which will be held at St. Louis, starting October first.

The race, which is the first balloon sporting event held anywhere in the world since America's entry into the war, has been organized by Major A. B. Lambert, veteran balloonist of St. Louis, and the Missouri Aeronautical Society.

Captain Charles I. Glidden, Chairman of the Aerial Tour-

Captain Charles J. Glidden, Chairman of the Aerial Touring Committee of the Aerial League of America, will act as starter of the race, and Mr. George M. Myers, president of the Aero Club of Kansas City, and Major A. B. Lambert will represent the Contest Committee of the Aero Club of

The fourteen entries already received include three Army and three Navy entries who will participate, but, in accordance with Army and Navy regulations, will not compete for

The civilian entries and the cities they represent are as fol-

The civilian entries and the cities they represent are as follows: Captain Elmer G. Marschuetz, St. Louis; Captain Carl F. Dammann, Wichita, Kansas; Ernest S. Cole, St. Louis; John S. McKibben, St. Louis; O. L. Bumbaugh, Indianapolis; H. E. Honeywell, Kansas City; Ralph Upson, Akron, Ohio; Warren Rasor, Brookville, Ohio; William Assman, St. Louis, and Paul J. McCullough, St. Louis.

Of the entries, Cole, McKibben, Honeywell, Rasor and McCullough were balloon instructors in the United States Air Service during the war. Honeywell is the most famous of the five as a racing balloonist. In 1912 he was second in the International Race, starting from Berlin, landing 1,200 miles away, at Moscow, Russia. He has numerous other trophies, won in national and international competitions. In the Paris won in national and international competitions. In the Paris International Race some years ago, he crossed the English Channel, landing in England.

Upson is the "ace" balloonist and dirigible pilot and won the

Upson is the "ace" balloonist and dirigible pilot and won the International Balloon Trophy in 1913.

That this race is expected to revive the sport of ballooning, and next year there will be a number of ballooning events held in the United States, including a huge international balloon race, is the opinion of Mr. Henry Woodhouse, Chairman of the Dirigible and Kite Balloon Committee of the Aero Club of America.

"Major A. B. Lambert, the pioneer aeronaut of St. Louis, and his associates who have organized the National Balloon Race to start from St. Louis October first, deserve high praises for reviving the sport of ballooning," said Mr. Woodhouse in an interview revealing the important work done by balloonists in the war.

"Ballooning has proven of great value to the nation during "Ballooning has proven of great value to the nation during the war. The pioneer Americans who followed the sport of ballooning before the war, including Major A. B. Lambert, Major J. C. McCoy, Frank S. Lahm, Captain Charles J. Glidden, Lieutenant-Colonel Henry B. Hersey, Ensign Raffe Emerson, and the veteran balloon experts including Major Thomas S. Baldwin, A. Leo Stevens, Ralph H. Upson,, R. A. D. Preston, Roy A. Knabenshue and others, were a valuable asset to the nation during the war. They were of great assistance to veteran Army balloon experts who, like Colonel Frank P. Lahm, Colonel Charles de F. Chandler and Commander L. H. Maxfield, U. S. N., were called upon to build up an efficient balloon service upon America's entry into the war.

"It will be recalled that Major A. B. Lambert at this time took the initiative and, with the substantial co-operation of Mr. James W. Bemis, and other energetic officials and members of the Missouri Aeronautical Society, established a balloon school at St. Louis and started to train balloon pilots for the Army balloon reserves.

"The writer recalls visiting this school at St. Louis in the summer of 1917, with Congressman Murray Hulbert and Mr. Alan R. Hawley, the president of the Aero Club of America. It was an active, efficient organization and it did our hearts good to know that it was producing trained balloon pilots as fast as were wanted to send overseas.

The War Department records show that the work of the U. S. Army Balloon Corps is one of the most brilliant chapters of the history of America's participation in the war.

"Many ex-Army and Navy reserve officers who were in the balloon service during the war are anxious to participate in balloon sporting events, and a number are preparing to enter balloon sporting events, and a number are preparing to enter the National Elimination Balloon Race, the winners of which are to represent the United States in the International Bal-loon Race, to be held in the United States next year, the In-ternational Trophy being held by the Aero Club of America."

## FIRST TRANS-CONTINENTAL AERIAL DERBY TO BE MOST EXTENSIVE CONTEST EVER HELD

O make the First Transcontinental Aerial Derby the most important and extensive aeronautic contest ever held, Rear Admiral Robert E. Peary, President of the Aerial League of America, has appointed a large committee of leading aeronautic authorities to draft the rules and set the dates for the Derby, the prizes for which are expected to exceed the total of \$100,000.

The committee appointed by Admiral Peary includes leading American aeronautic authorities, as follows: Chairman, Captain Charles J. Glidden, donor of the Glidden Aeroplane Efficiency Trophy, of Washington, D. C.; Lieut. Godfrey L.

Cabot, president of the Aero Club of New England; Major B. Lambert, Chairman of the Executive Committee of the A. B. Lambert, Chairman of the Executive Committee of the Missouri Aeronautical Society, of St. Louis; Major Loring Pickering, of San Francisco; Rear Admiral Pond, U. S. N., president of the Pacific Aero Club; C. C. Johnson, president of the Aero Club of Colorado; Charles Dickenson, president of the Aero Club of Illinois; Major Reed G. Landis, second ranking American "Ace"; Joseph A. Steinmetz, president of the Aero Club of Pennsylvania; Alva Bradley, Chairman, Aviation Committee, Cleveland Chamber of Commerce, the president of the Cleveland Aviation Club; George M. Myers. president of the Cleveland Aviation Club; George M. Myers,

president, Aero Club of Kansas City; Henry Woodhouse, member Board of Governors, Aero Club of America; G. Douglas Wardrop, Editor of Aerial Age Weekly; Major Granville A. Pollock; W. E. Boeing, president, Aero Club of the Northwest; Alberto Santos-Dumont, honorary president, Pan-American Aenonautic Federation; Colonel E. Lester Jones, Director, U. S. Coast and Geodetic Survey; Colonel C. G. Edgar, of Detroit; Roy D. Chapin, president, Aero Club of Michigan; Albert T. Bell, president, Atlantic City Aero Club; Wm. F. Brooks, president, Aero Club of Minneapolis; Lieut. C. A. Wright, president, Aero Club of Texas; Clarence Young, president, Aero Club of Iowa; John P. Salzer, president, Aero Club of La Crosse, Wisconsin; Captain J. F. Joyce, president, Aero Club of Maryland; Major John M. Satterfield, president, Aero Club of Buffalo; Raymond R. Farquhar, president, Aero Club of Buffalo; Raymond R. Farquhar, president, Aero Club of Lincoln, Nebraska; Major Smith, president Washington Aviators' Club; Major J. E. H. Stevenot, president, Aero Club of the Philippines; Captain Beatty, president, Aero Club of Canada; James W. Bemis, of the Missouri Aeronautical Society.

It is expected that each of these clubs will enter one or more aeroslanges in the Derby and that every estate in the

It is expected that each of these clubs will enter one or more aeroplanes in the Derby, and that every state in the Union will be represented in the race.

The preliminary draft of the purposes of the First Trans-continental Aerial Derby, which is being sent to each member of the committee by Chairman Glidden, for additions and

The purposes of the Transcontinental Aerial Derby are:

(1) To establish and open the first transcontinental airway

by first establishing landing places at every fifty miles across the continent, from coast to coast, and then give inducements to aviators to fly over the airway, landing on the established landing places. It is hoped that this Derby and the Aerial that will follow will lead to the establishing of permanent air lines across the continent for carrying mail, passengers and express.

(2) To foster the design and construction of efficient aeroplanes with a view to maximum speed and greater safety

of air travel.

(3) To test the reliability and economy of existing aero-

plané engines.

To bring about increased efficiency in the design of aeroplanes especially fitted for the transportation of passengers, mail and express.

(5) To foster the practice of flying by chart and compass

and navigating the air entirely by the use of instruments.

(6) The aeroplanes entered to be equipped with self-starters and mufflers, which will afford an extensive test and bring about maximum improvement in these very important devices.

#### Classes of Entries

(1) Single-motored aeroplanes of any horse power, touring, pleasure and limited to transport class, cabin for the protection of passengers when three or more passengers are carried.

Multi-motored aeroplanes of any horse power, with suitable cabin for the protection of passengers against the elements and waterproof and fireproof containers for mail and express carried.

## PROPOSALS REQUESTED FOR EXPERIMENTAL AEROPLANES

HE contracting officer of the Engineering Division of the Air Service has issued a circular proposal for aero-

plane design and construction as follows

- 1. Sealed proposals, in duplicate, subject to the usual provisions of Army Regulations, will be received at this office until 10:00 A. M., October 15, 1919, and then opened, in the presence of such bidders as attend, for furnishing the Government certain types of experimental aeroplanes, to be designed and constructed by successful bidders. Specifications and complete information are on file here in the office of the Engineering Assistant to the Chief of the Engineering Division, Air Service, and are open to inspection of bidders between 8:30 A. M. and 4:30 P. M., daily, except Sunday. Each bid must be accompanied by the information required in these specifications.
  - 2. Compliance with the following regulations is enjoined:
- All proposals must be in conformity with the specifica-tions furnished by this Division and this Circular Proposal, to which they must make specific reference.
- Proposals must indicate the post office address of the bidder, giving city, county and state, and bear the exact legal signature of the person, firm or corporation submitting the proposal. Corporate proposals and those of firms or partnerships must be accompanied by satisfactory evidence of authority of the official who signs the same to act for and bind his principal.

All numbers and prices must appear both in words and figures; all erasures and interlineations must be initialed

by the person who signs the proposal.

Each proposal must be accompanied by a certified check in an amount equal to 20% of the bid, which check shall be a guaranty to the Government upon the part of the bidder to enter into the usual form of contract required by the Engineering Division, Air Service, to perform the work proposed in the bid, if accepted. Certified checks will be returned after contract has been entered into and approved by the Engineering Division, Air Service, and checks of those whose bids are rejected will be returned promptly upon such rejection.

Each proposal in duplicate with certified check must be securely sealed in a suitable envelope marked:

"The Contracting officer, Engineering Division, Air Service, McCook Field, Dayton, Ohio. Proposal for design and construction of experimental aeroplane. To be opened publicly at 10:00 A. M., October 15, 1919." Such proposals must be in the possession of the Contracting Officer, so addressed, before the hour appointed for the opening.

(f) The Government reserves the right to reject any and

3. The policy in general of the Engineering Division, Air Service, is to order three of each type of aeroplane, the first aeroplane to be for physical inspection and static load tests.

The armament, power plant, instruments and other accessories must be installed in it, but certain refinements of finish and design may be omitted. The second aeroplane is for performance tests and it must be complete with armament. power plant, instruments and other accessories. The construction of this aeroplane must be held back by the Contractor not to exceed thirty days after delivery of the first, to permit incorporation of any changes which appear necessary or advisable from the physical inspection and static tests of the first. The third aeroplane must also be complete with armament, power plant, instruments and other accessories and is intended to be a finished sample. Its construction must be held back by the Contractor for not to exceed forty-five days after the delivery of the second, to permit incorporation of any changes which appear necessary or advisable from the tests of the first two. No payment will be made to the Contractor for any changes or alterations in any aeroplane which result from his failure to observe and comply with Air Service and Engineering Division specifications, or from his noncompliance with such additional specifications as are covered by his contract. The cost of such other changes and altera-tions as are required by the Government in the second and third aeroplanes, will be covered by an agreement supple-mental to the contract, upon a fixed price basis.

4. Bidders must also submit separate bids for both a complete set of working drawings and a bill of material, both of the third aeroplane, to be in the form of vandykes, these to be delivered within thirty days after the delivery of the third aeroplane on any contract. A complete set of working drawaeropiane on any contract. A complete set of working drawings is defined as those drawings from which the third aeroplane has been constructed. They must embrace the alterations and changes made in this aeroplane and contain no obsolete data. Sketches will not suffice, but drawings to a definite scale must be provided. These working drawings need not be detailed drawings in the sense that they must give a detail of every part of the aeroplane, but the working drawings should consist of between 300 and 400 separate prints, from which an experimental constructor of percentage could represent which an experimental constructor of aeroplanes could repro-

duce the aeroplane in limited quantities.

5. Bidders must take into consideration the fact that a contract will give to the Government the complete right (nonexclusively) to make, use and sell, and have made for ernmental purposes, such aeroplanes, so far as any rights of the Contractor are concerned, resultant from the development work covered by the specific contract. In the event a bidder considers he should be entitled to compensation for his design and the rights of production of it, he must submit, as a separate item of his sealed bid, a proposal for the rights to the design and of its production, but such proposal will be considered as a cost element in determining a successful bidder. such proposition must be both upon a royalty basis, dependent upon the number of aeroplanes of such design constructed by or for the Government, and a flat sum for the rights of design. Failure to submit the hids called for in this (Continued on page 30)



# THE NEWS OF THE WEEK



Major Schroeder Breaks Two-Passenger Altitude Record

Dayton, Ohio.-Major R. W. Schroeder on September 6 reached an altitude of 29,000 feet carrying Lieutenant George Elfrey as observer. This is believed to be the world's two-passenger altitude record.

Captain Lang, of the Royal Air Force, with Lieutenant Blowes as passenger, made a flight in England several months ago, at first reported to be one of 30,500 feet altitude. Examination of the altimthe altitude. Examination of the altimeter later proved this figure wrong and the altitude of Captain Lang's flight was reported at 27,000 feet. This has remained the unofficial two-passenger altitude record until Major Schroeder's flight at McCook Field.

#### Aero Club of La Crosse Organized

La Crosse, Wis.—An Aero Club has been organized here by local business men and aeronautic enthusiasts. The following officers have been elected: President, John P. Salzer; vice-president, Arthur A. Bentley; secretary, James R. Kinsloe.
The City Council and the Chamber of

Commerce, co-operating, have secured a five-year lease on eighty acres of land which has been placed in condition for an aeroplane landing place. The club is endeavoring to secure a permanent city-owned municipal air station before this lease expires.

#### Flying Boat Tour Across New York State

Port Washington, L. I.-W. M. Blair, recently a lieutevant in the United States Navy; C. C. Robinson, late Captain of the Royal Air Forces, and Raymond Curley left Port Washington on September 8 in a Curtiss Sea Gull for a flight up the Hudson and across New York state via the new Barge Canal to Detroit, the first extended flight across New York state in a flying boat. The Sea Gull which is making the flight is equipped with a Curtiss K-6 motor and has a speed

of 76 miles an hour.

The route to be followed will take the fliers from Port Washington northward up the Hudson River to Albany, from Albany westward along the canal to



Lieut. William Finlay, who will pilot the giant White Monoplane on its trans-Pacific flight

Oneida, from Oneida to Oswego, thence to Buffalo, Cleveland, and Detroit, following from Oswego along Lake Ontario and Lake Erie. The fliers expect to make the journey in two and one-half days. The Sea Gull, in addition to carrying three passengers, is also carrying their

#### Schroeder Wins Toronto Race

New York, N. Y.—The official results of the New York-Toronto race have been made public recently, and Major R. Schroeder in the final computation is announced as winner. Major Schroeder, under a War Department ruling, is not permitted to accept prize money.

The civilian winners of the New York-Toronto race, among whom will be divided the \$10,000 given by the Hotel Commodore, are as follows in the order of percentages: R. H. Depew, C. S. Jones,

Roland Rholfs, S. S. Moore, L. W. Bertaud, C. A. Schiller, O. S. Palmer and W.

C. Barker.

To determine the winners it was necessary for the contest committee to obtain from Government records the theoretical performance of each aeroplane in the contest, flying with maximum useful load. This was used as a basis for finding in percentages the relative performance of the individual machines with the actual load carried. A machine with a record of 105, for example, exceeded its theoretical performance by 5 per cent. The percentages for the best ten entries are as follows

as follows:
Major R. Schroeder (VE-7), 107.8; R.
H. Depew (JN-4D), 106; Lieut. W. R.
Taylor (JN-4H), 96.8; Capt. H. B. Chandler (JN-4H), 90.8; Lieut. D. B. Gish (DH-4), 85.2; Lieut. C. S. Jones (JN-4D), 82.3; Lieut. Roland Rholfs (Curtiss), 82; Lieut. B. W. Maynard (DH-4), 80.9; Capt. S. S. Moore (Canadian Training), 78.6; Lieut. M. J. Plumb (DH-4), 77.6.

#### Ten Balloons Entered for St. Louis Race

Ten balloons representing six cities The balloons representing six chies have been entered for the national balloon race, which will start from St. Louis on October 1, by Major Albert Bond Lambert, who is directing the arrangements for the race. St. Louis has five entries.

Major Lambert said the character of

Major Lambert said the character of the pilot indicated to him that the national and international long-distance flight record of 1,350 miles, set by Alan Hawley of New York, starting from St. Louis in 1909, might be bettered.

The entrants and the cities they represent follow: Capt. Elmer G. Marschuetz, St. Louis; Capt. Carl W. Dammann, Wichita, Kan.; Ernest S. Cole, St. Louis; John S. McKibben, St. Louis; G. L. Bumbaugh, Indianapolis; H. E. Honeywell, Kansas City; Ralph Upson, Akron, O.; Warren Rasor, Brookville, O.; William Assman, St. Louis, and Paul J. McCullough, St. Louis.
Capt. Charles J. Glidden, president of the Aerial Touring Association, will act as starter for the race.

as starter for the race.



The Bécherot biplane, with 300 H.P. Hispano-Suiza engine

Of the entries, Cole, McKibben, Honeywell, Rasor and McCullough were balloon instructors in the United States Service during the war. Honeywell is the most famous of the five as a racing balloonist. In 1912 he was second in the international race starting from Berlin, landing 1,200 miles away at Moscow, Russia. He has numerous other trophies won in national and international competition. In the Paris international race several years ago, he crossed the English

channel, landing in England.

Upson is the "ace" balloonist and dirigible pilot of the Goodyear Rubber Co., which is building a balloon for the St. Louis race. Three other balloons designed to be the best creations for racing that balloon experience dictates are now nearing completion at the grounds of the Missouri Aeronautical Society in St. Louis, where the start of the race will be made. Each is being constructed for lightness. They are the balloons to be lightñess. They are the balloons to be McKibben, Bumbaugh, and

Honeywell.

The world's endurance balloon record is held by a Frenchman at 72 hours, but the mark is being attacked because a part of the time was spent over water with

a drag rope out.

prizes for the race are \$500 for first, \$300 for second, and \$200 for third, either in cash or in silver plate of equal Gas will be furnished contestants free of charge, the combined cost of the national race and of the dual meet of naval and army balloonists, which will be held at the same place on September 26, being estimated at \$12,000. The expense is being borne by the Missouri Aeronautical Society without outside sub-scription. The race is under the direction of the Aero Club of America.

#### Lawson Air Liner on Long Test Flight

Syracuse, N. Y.—The Lawson twentysix passenger air liner landed at Bethka Field here on September 4, after flying here from Milwaukee. Stops were made at Cleveland and Buffalo. The plane was damaged in landing here, but will resume her journey in a few days as soon as repairs are completed. A crew of five and four newspaper men are being carried as passengers.

#### California Newspaper Uses Aerial Delivery

Riverside, Cal.—The Riverside Daily Press has arranged with Guy W. Talbert, California sales representative of the Curtiss Aeroplane & Motor Company, for the regular weekly distribution by aeroplane of the special farm and tractor editation. tion of that newspaper. The route in-cludes Perris, Nuovo, San Jacinto, Hemet, Murrietta Hot Springs, Murietta and Elsinore, a district which is inaccessible and some distance from any direct and rapid means of transportation. tiss JN-4D, which will be piloted by R. I. Crozier, a well known aviator, will save twenty-four hours in the delivery of the special weekly edition.

#### Oldest Passenger Carried in Indiana

Maron, Ind.-Mrs Alvira Bates Towner, 89 years old, is the oldest aeroplane passenger on record. David B. Lindsey, chief pilot, secretary and treasurer of the Indiana Aircraft Company, took her up at the Laporte County Fair on August 30, where he was doing passenger carrying and exhibition work. Lindsey was a member of the 28th Aero Squadron, and received his commission at Wilbur Wright



# Actress Buys Aeroplane to Cover 40-Week Vaudeville Tour

New York, N. Y.—Hope Eden, a well-known vaudeville entertainer, is the first to employ an aeroplane as a means of transportation.

She began her 40-week tour on the Keith circuit by flying, on August 31st, from Buffalo to Syracuse in a Curtiss JN-4D aeroplane piloted by J. D. Hill of the sales department of the Curtiss Aero-

Miss Eden's first flight will soon be followed by others. From Syracuse her itinerary calls her to Albany, and this trip, as well as later ones, from city to city, taking her through Schenectady, Troy, Worcester, Mass.; Springfield, Mass.; Hartford, Conn.; New Haven, Conn.; Bridgeport, Conn.; Philadelphia, Baltimore and the cities of the South are to be made by air.

Miss Eden is appearing with Norman Frescott in a psychic act. She is the youngest mind reader in the world as well as the first actress to travel by aero-

#### Sale of Navy Flying Boats and Engines

The Bureau of Supplies and Accounts of the Navy Department has asked AERIAL Age to publish the following information concerning the sale of equipment:

After a careful survey of the flying equipment of the Navy, sale has been authorized of a large quantity of heavier-than-air equipment, which is in excess of the present needs of the Navy,

This flying equipment is standard manufacture, accepted by the Navy after stringent inspection. It has been held in storage and most of the equipment is in

excellent condition.

The sale will be made by sealed proposals received up to 2 P. M., September 22, 1919, at the Bureau of Supplies and Accounts, Salvage and Sales Section, Navy Department, Washington, D. C. There are 219 flying boats and seaplanes to be sold and 441 engines, exclusive of those installed in the boats or to be supplied to them when they are sold.

Bids will be received on any quantity of seaplanes, flying boats or engines from one to the entire quantity. The schedules of sale accurately describe the material

and bidders may bid on an individual boat or engine, or several of them, or on an entire class. The appraised value of each flying boat, seaplane and engine is given in the schedule of sale.

Awards will be made when the bids are above the appraised value. bids are below the appraised value awards may or may not be made. As the awards will be made to the highest bidder, alternate bids are invited so that if a bidder desires he may bid on several planes, stating in his bid the quantity of planes or engines desired.

There will be offered 83 H-S-2-L flying These are Pusher bi-planes, upper boats. boats. These are Pusher bi-planes, upper wing spread, 74 feet, 2 place, approximate speed 91 miles per hour. These are stored at the Fleet Supply Base, South Brooklyn, New York. Some of these flying boats are fitted with radio equipment. With each flying boat one new 330-hp. Liberty engine will be furnished. These are all new boats in good condition, many of them in the original crates.

Another very attractive class of sea-planes which will be offered is a lot consisting of 52 H-16 seaplanes and 20 F-5-L. These are tractor biplanes, with an upper wing spread of 95 feet and an approximate speed of 95 and 87 miles per hour. They are 4 and 5 place machines, and each will be fitted with two new 330-hp. engines. These are stored at the Naval Aircraft Factory, Philadelphia, Pa.

Among the small machines to be sold 50 Aeromarine, type 39-B seaplanes, a single float. These have an upper are 50 Aeromarine, type 39-B seaplanes, with single float. These have an upper wing spread of 47 feet. They are 2-place machines, each fitted with a Curtiss OXX-6, 100-hp. engine in place. The approximate speed is 68 miles per hour. These are stored at Naval Aircraft Storehouse, Gloucester, N. J.

Among the small machines to be sold are also 10 aero model 40 flying boats.

are also 10 aero model 40 flying boats stored at the Army Supply Base, Norfolk, Va. These are 2-place boats, upper wing spread 48 feet 4 inches, equipped with en-gines, approximate speed 70 miles per

hour.

The 441 separate engines to be sold are all in storage at the Naval Aircraft Store-house, Gloucester, N. J. The largest sin-gle lot consists of 250 Curtiss OXX-6

engines of 100 hp. each, which are new.
There are also 51 Hispano Suiza engines, 220 hp. each, foreign built.
There will be 72 used Curtiss engines offered for sale; also 20 used Hall Scott engines, 9 Salmson Hydro-Glycier engines, 220 hp. each, and 32 100-hp. Gnome engines, new and used.

This material is all stored at the Fleet This material is all stored at the Fleet Supply Base, South Brooklyn, New York; Naval Aircraft Factory, Navy Yard, Philadelphia, Pa.; Naval Aircraft Storehouse, Gloucester, N. J.; Naval Air Station, Hampton Roads, Va., and Army Supply Base, Norfolk, Va. Inspection is invited and may be arranged with the Supply Officers at the above stations.

It is believed that this method of offering surplus aircraft for sale will so widely distribute the material as to benefit aviation in general by affording everyone interested an opportunity to buy new planes very reasonable figures. The bidders will be expected to examine the planes before purchasing, and the Navy will load them on trucks, lighters or open-end freight cars, but will not set them up preparatory to flight.

In order to make the sale complete, arrangements have been made to supply each of the larger classes with all accessories and instruments furnished in the regular Navy equipment for that type of plane. In addition, handling trucks are included and many sets of spares.



Wrigley Uses Two Curtiss Planes to

Mrigley Uses Iwo Curtiss Planes to Advertise His Product
Chicago, Ill.—William Wrigley, Jr., manufacturer of Wrigley's Spearmint Chewing Gum, has engaged two Curtiss JN-4D aeroplanes, which he will use in advertising his product throughout the Middle West. The planes, owned by John Hammond, brother of Lee Hammond the well-known payal aviator who mond, the well-known naval aviator who is in charge of the Chicago office of the Curtiss Aeroplane & Motor Corporation, will tour Indiana, Illinois, Iowa and Wis-Facsimiles of the well-known Spearmint wrappers are painted on the sides of the machines and sample packages of gum, attached to toy parachutes, will be dropped over the various towns and cities which will be visited on the

Personal Pars

H. G. Pederson, formerly with the Wright-Martin Aircraft Corporation, has joined the General Motors of Canada, Limited, Walkerville, Ont. He will be in the production department.

Cliff Durant, son of W. C. Durant, president of the General Motors Company, has purchased a Curtiss JN-4D for his personal use and is now flying in California.

British Manufacturers After South American Aeronautic Business

aviation interests are showing considerable activity in South America. There is not a country in all Latin America where companies of British origin have not made preliminary investigations in connection with establishing aviation stations or factories. During the late months of the war a member of a British company made a tour throughout South America studying conditions and sending reports to the home office so that everything would be in readiness for the drive for this business at the conclusion of hos-

British interests are already engaged in enterprises in Brazil where the government is considering establishing routes between the capital and the interior under British management. The British have also made proposals for the establishment of aeroplane factories. Similar activities are reported in Uruguay, Colombia, Peru and Venezuela.

The latest country, however, to receive the attention of British aviation companies is Chile. The government has received a proposal from a representative of one of these syndicates for the construction of an aeroplane factory near Santiago. The Government is looking upon the proposal with favor. Chilean aviators are supporting the plan, as it will mean an increased production of aeroplanes in the country.

B-G Plugs Gave Excellent Account in Toronto Race

New York, N. Y .- The excellent record of performance made by B-G plugs in the New York-Toronto-New York race is evidence of its successful design. This spark plug is so constructed that it will scavenger itself at all times when operating on a high compression Liberty engine. The oil pressure on the engine may be increased to any pressure desired without causing the plugs to foul, thereby insuring a minimum amount of friction

in the motor parts.

An original set of twenty-four plugs was flown in a twelve-cylinder, highcompression Liberty motor for 100 hours 32 minutes. It was then changed to a newly overhauled motor and flown for an additional 17 hours and 52 minutes without any attention whatever before a miss fire occurred, after which total time one plug missed; this was corrected by adjusting the spark gap. The set was then again flown for 23 hours more, and is still flying after having been in the air over 141 hours.

During the tests of this plug that were conducted at Dayton, Ohio, it went through each test with a 100 per cent performance record. It was found to be impossible to cause any of the original twenty-four plugs to fail on the flying test on a Liberty engine; in fact, the original twenty-four plugs completed the

standard flying time test and have so far run for a total of 141 hours. Four aeroplanes of Colonel Claggett's recruiting squadron, which entered the New York-Toronto race, using Liberty engined De Haviland Four planes, were supplied with B-G spark plugs on different dates. Lieut. Adams had obtained about 80 flying hours out of his set of plugs before the race, and he completed the race with 100 per cent plug perform-ance. Lieut. Plumb made a similar record with a set of plugs which had given 37 hours of service before the race. Lieut. Midkiff had obtained 40 hours in the air and 145 hours on the motor before the race, and he also made a 100 per cent performance record. Lieut. Logan and Lieut. Brown each had a new set of plugs before starting on the race, and obtained a perfect performance record with them. Lieut. Maynard, the winner of the speed

contest, made an average of almost 145 miles an hour in the race and no cylinder quite firing, although one plug was found

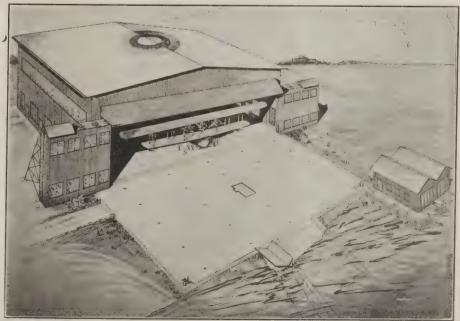
defective at the end of the race.

Lieut. Coates, with a twelve-cylinder
Liberty engine, had sixteen new B-G
plugs and eight standard plugs on his ship. Fifteen B-G plugs completed the race with a perfect performance, while all the plugs in his engine had changed at each control. Lieut. Kirkpatrick, Major Schroeder and Sergeant Coombs each made 100 per cent performance with B-G plugs.

At Hazelhurst Field after the race several plugs were removed from various aeroplanes for examination. It was found that the insulation on each of the plugs removed was perfectly clean, due to the interior construction of the plugs which causes a scavengering action to take place between the points and around the insulation, both on the compression and on the explosion stroke.

Model Seaplane Hangars at Naval Aircraft Factory

A model flying boat hangar having an entrance 200 feet in width and 50 feet high and a depth of 150 feet is under construction at the Naval Aircraft Factory at Philadelphia for the accommoda-tion of the huge flying boats being built at the factory. The doors are electrically at the factory. The doors are electrically operated. A launching car, operated by an electric winch, runs on two rails 14 feet apart. Floating rafts are used to support the ends of the wings when launching in unfavorable weather. foot pier on one side and a 180-foot pier on the other give protection from the stream in launching the boat. The building on the end of the pier serves as a motor boat house. Gasoline and oil can be obtained from seven stations, one of which is on the end of the pier. Every convenience and devices possible modern convenience and device for greatest efficiency is provided.



Model flying boat hangar being constructed at the Naval Aircraft Factory at Philadelphia



How the Air Mail Is Routed Westbound:

#### New York via Cleveland to Chicago

The mail plane leaves New York between 5 and 6 A. M. with between 12,000 and 14,000 letters daily, including Sunday, and arrives at Cleveland about 10 A. M. and at Chicago about 1 P. M. the same day. The plane advances any letters mailed too late to leave New York on the 5.30 P. M. train and makes all moon. 5:30 P. M. train, and makes all noon carrier deliveries in Cleveland and all afternoon carrier deliveries in Chicago as well as advancing connections to the mid-dle West sixteen hours and to Seattle, San Francisco and Los Angeles twentyfour hours.

#### Cleveland to Chicago

The mail plane at Cleveland, in addition to mail originating in Cleveland, takes about 14,000 letters daily from train No. 19, which left New York at 5:30 o'clock the afternoon before and is not due to arrive in Chicago until 4 P. M., too late for the regular carrier deliveries in that city. The aeroplane puts this mail in Chicago daily at 1 o'clock, usually a little before 1 P. M., and in time for all city carrier deliveries. It also makes train connections which would not have been made had the mail remained on the train at Cleveland. Eastbound:

Chicago to Cleveland

The mail plane leaves Chicago at 2:30 P. M., which is a considerable time after the departure of the Twentieth Century Limited, which train the mail plane overtakes at Cleveland with an hour to spare and deposits on that train Chicago city mail and mails from westbound connections. This mail then is delivered by the Twentieth Century Limited in New York City at 9:40 A. M. Had the letters not been placed on the train at Clauded. been placed on the train at Cleveland they would not have reached New York City the following day in time for the carrier deliveries.

#### Cleveland to New York

The mail plane takes besides letters originating in Cleveland and destined for the East between 12,000 and 14,000 let-ters from train No. 90-28-32, which left Chicago at 11:31 P. M. the previous night, and delivers it at New York City, usually around 1:30 o'clock that afternoon, Had this mail remained on that train it would

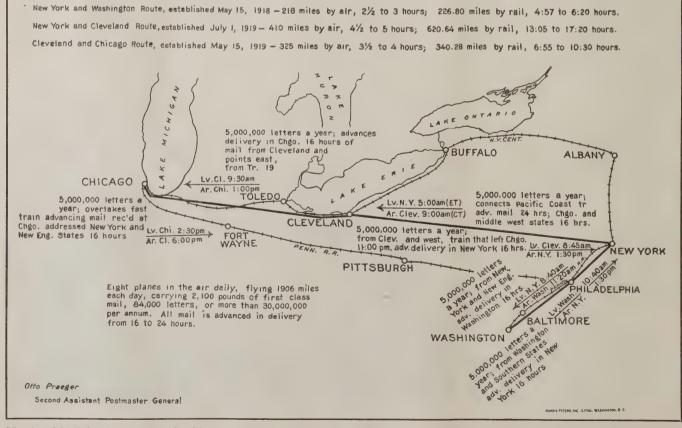
not have arrived in New York City until 4:44 o'clock the following morning. Southbound:

#### New York to Washington

The mail plane leaves New York at 8:40 A. M. with New England midnight mail and New York City mail reaching the post office too late for the 1 A. M. dispatch for Washington, also New York up-state mail arriving on New York Central train No. 32, to the amount of 14,000 letters daily, which are turned over to the Washington postmaster in time for the noon and first afternoon deliveries. Northbound:

#### Washington to New York

The mail plane leaves Washington at 10:40 A. M. with 14,000 letters daily to New York City, including Washington city letters mailed before 9:30 A. M., and New York City mail worked to carriers arriving in Washington on the Seaboard Air Line and Atlantic Coast Line trains from all the southeastern states from Viryork by plane daily about 1:30 P. M. Had it continued by train to New York it would not have arrived in New York City in time to catch any carrier deliveries.



# THE SOPWITH AEROPLANES

THE Sopwith "Tabloid" biplane, although built in 1913, has had such an extraordinary effect on aeroplane design in general, and in particular was certainly the beginning of the greatness of the House of Sopwith, that it undoubtedly merits inclusion in this series of articles, reproduced through the courtesy of "Flight."

#### The Sopwith "Tabloid"

In its original form the Sopwith "Tab-

loid" was built as a side-by-side twoseater, with an 80 h.p. Gnome engine. It was built for Mr. Hawker, the famous Sopwith pilot, to be taken out to Australia in 1914, but very soon after its triumphant appearance a number of singleseaters of similar type were ordered by and built for the Army. This machine, as shown in the accompanying illustrations, had a skid type undercarriage and a balanced rudder, while there was no fixed vertical fin. The pilot and passenger sat

side by side, the pilot on the left. Lateral control was by means of wing warping. When this machine paid its first visit to Hendon it left everyone agape, as such speed as it developed had certainly never been seen, nor probably been believed possible, with a biplane type of machine. In those days the general opinion was that for speed one must have a monoplane, and it was not until the advent of the "Tabloid" that this fallacy was effectively cleared up. After that the small fast single-seater biplane received a great impetus, and the type began to become general all over the world. It will, therefore, be seen that the world at large, and British aviation in particular, owes a debt of gratitude to the Sopwith firm for having demonstrated the possibilities of the small biplane. In addition to its great maximum speed—92 m.p.h.—the "Tabloid" was remarkable in those days for its great speed range, as it would fly as slowly as 36 m.p.h. This was a range of speeds which none of the contemporary monoplanes were capable of.

In its single-seater form the "Tabloid" underwent various minor alterations. Thus one form was with skid undercarriage, but with the front struts slightly more raked than they were in the original machine. Another slight alteration was the addition of a vertical fin in front of the rudder, which latter was not balanced. The next step in the evolution of the "Tabloid" was seen when the late Mr. Harold Barnwell flew a "Tabloid" in the aerial Derby. This machine, although similar to its prototype, was fitted with a vee-type undercarriage. Finally, the "Tabloid" entered the last stage of its development by being fitted with ailerons instead of warping wings, and in this form it was a most successful single-seater scout.

#### The Gun 'Bus

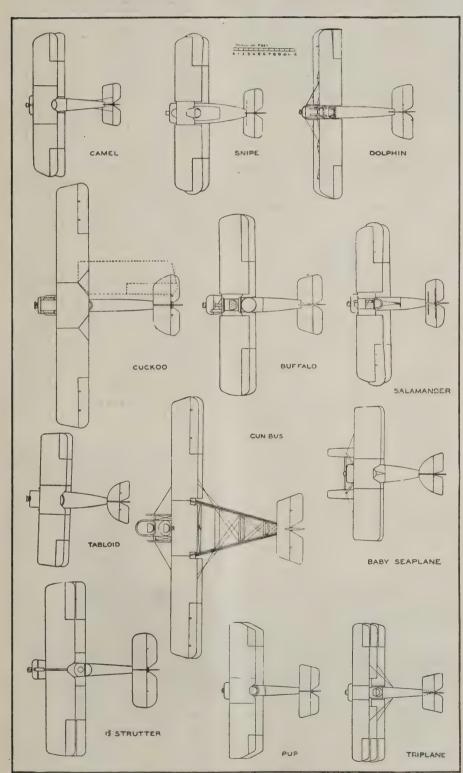
As a result of their experience with Sopwith school pushers, the Sopwith firm were given an order by the Greek Government for a number of somewhat similar machines, carrying a pilot and gunner, but not fitted with dual controls. A gun was mounted in the nose of the nacelle. This order was nearing completion when war broke out, and the machines were commandeered by the Admiralty. From August, 1914, they were immediately put into service, being among the first aeroplanes to be armed, and were equipped with land undercarriages instead of the original float chassis. The earlier batches were equipped with 100 h.p. Gnomes, but later water-cooled Sunbeams were fitted. The scale drawings and photograph show one of these machines fitted with a 150 h.p. Sunbeam.

#### The Torpedo Seaplane

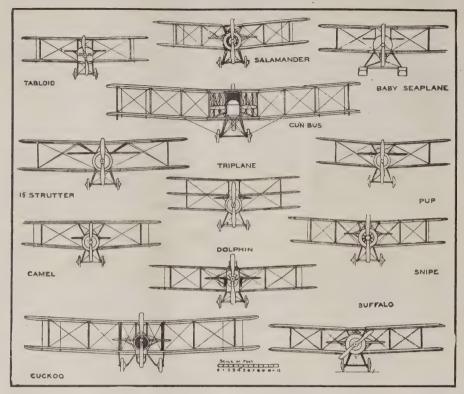
In 1915 the Sopwith Co. built for the Admiralty a torpedo-carrying aeroplane. This machine was of an experimental character, but is notable as having been the forerunner of the famous Sopwith "Cuckoo." It was fitted with a 200 h.p. Canton-Unne engine.

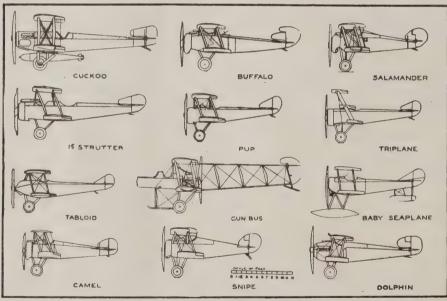
#### The Tractor Seaplane

In the matter of tractor seaplanes the Sopwith Co. had already done good work in connection with, for instance, the circuit of Britain, and they were therefore in a position to undertake the design and con-



Plan views of the Sopwith aeroplanes





Front and side views of the Sopwith aeroplanes

struction of machines of this type when, early in the War, the Admiralty ordered some seaplanes. It was designed for reconnaissance work and was unarmed. The engine fitted was a 100 h.p. Gnome monosoupape. From the illustration it will be seen that this machine was fitted with folding wings. A somewhat similar machine of the land type was built also. The land machine differed, however, in several respects from the seaplane, apart from the difference in undercarriage. Thus the span of the two planes was equal. Machines of this type caused curiosity heiefly on account of the bomb racks fitted on the struts of the undercarriage, a feature that was somewhat unusual in those days.

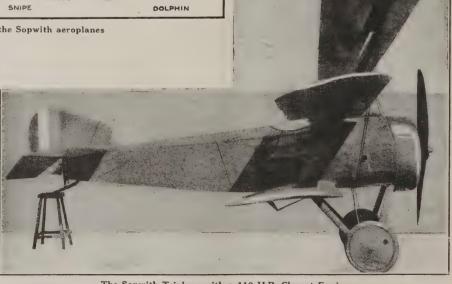
#### The Sopwith Bat Boat

Although not included in the drawings, the Sopwith Bat Boat merits brief mention here on account of the good work done by this type of machine before the War. Thus it may be remembered that the Sopwith Bat Boat, which was first exhibited at the Olympia Aero Show of 1913 and which had a 100 h.p. Green engine, won the Mortimer Singer Trophy by starting off the sea, coming down on land, and starting from the land alighting on the sea again. This was accomplished by fitting it, in addition to the boat, with a collapsible wheel undercarriage. Probably this was the first flying boat to be built in Great Britain. A later type of bat boat was fitted with a 200 h.p. Salmson engine and differed from the previous type in various details. Thus, for instance, it had a straight top plane, while the bottom plane had a pronounced dihedral. Also it had a single rudder instead of the twin rudders of the previous model. Also the tail booms were so arranged as to form a Vee when seen in plan view. Boats of this type were ordered by Germany before the War, and from photographs later published in German aviation papers it would appear that the Germans made several copies of this machine, imitating the original down to the smallest details.

#### The Baby Seaplane

The Baby Seaplane was an immediate development of the "Tabloid," from which it differed principally in the fitting of floats instead of wheels. One of these machines made history by winning the Schneider Trophy at Monaco, and the Baby Seaplane is very similar to the famous Sopwith "Schneider." In this machine wing warping had given way to ailerons. The floats were of the plain, non-stepped type, and a tail float of considerable size was fitted under the stern. The engine originally fitted was a 100 h.p. Gnome monosoupape, but later on 110 and 130 h.p. Clergets were also used.

It is of interest to note that, although this seaplane performed highly successfully at its first appearance, it was more or less put on one side at the outbreak of the War, and it was not until November, 1914, that the demand arose for a fast single-seater seaplane. It was then immediately put into production, and from that



The Sopwith Triplane with a 110 H.P. Clerget Engine

distant date until the signing of the Armistice the Sopwith Baby Seaplane has been continually in service.

#### The 11/2-Strutters

The Sopwith 1½-Strutter has claims to great historical distinction, not only for its great capabilities for use as a fighter, but indirectly, it set a new fashion in aerial fighting, being the first British aeroplane to carry a synchronized gun firing through the propeller. The Sopwith-Kauper synchronization gear which made this possible was developed at the Sop-with works, and was as much a product of this firm as was the machine in which it was installed. It was also fitted with the Scarfe gun ring for the gunner, which has since become such a well-established feature on all fighters. The 1½-Strutter was originally designed as a high-per-formance two-seater fighter, with a 100 h.p. Clerget engine. At the time of its introduction it was justly regarded as an extraordinarily good 'bus, having an excellent performance and a good manœuvrability. Incidentally it established a world's altitude record for an altitude of 23,980 ft. In view of its good performance, coupled with its (for the times) excellent armament, the 1½-Strutter had a tremendous success, and it is not surprising that many machines were built to the order of the Governments of Roumania, Russia, America and Belgium. In addition, it might bee mentioned that the French Government has manufactured under license no less than 4,500 machines of this model. In addition to the novel points connected with the mounting and firing of the guns carried, the 1½-Strutter was interesting in several other respects. Thus the wing bracing—which gave it its name
—was very unusual, and in a modified form set a new fashion, so to speak. top plane was in two halves, bolted to the top of a central cabane, while the spars were provided with an extra support in the shape of shorter struts running from the top longerons to the top plane spars some distance out. In the single-seaters to follow this bracing of the top plane was generally adopted, with the exception that the central cabane was done away with, the outer struts of the W formation having a slightly less pronounced slope, and supporting a separate top plane centre section. Aerodynamically the 11/2-Strutter is of interest in being fitted with an air brake in the form of adjustable flaps in the trailing edge of the lower plane adjacent to the fuselage. These flaps could be rotated by the pilot until they were normal to the wind, thus helping to pull the machine up when about to land.

A more successful innovation incorporated in this machine was the trimming gear, by means of which the angle of incidence of the tail plane could be altered during flight. In this manner the difference in weight of the passenger carried could be counteracted by the tail setting, and also the tail could be adjusted for high speed, climbing, etc. This feature has since become universal practice on passenger-carrying machines.

#### The 11/2-Strutter Bomber

Originally designed as a two-seater fighter, the 1½-Strutter was later adopted as a single-seater bomber, and it is the machine which has been so successful in bombing, with good results, such towns as Essen, Munich and Frankfort. For bombing work the 1½-Strutter was equipped with a 130 h.p. Clerget, which afterwards took the place of the 110 h.p. Clerget in the standard two-seater fighter model. It might also be mentioned that

fairly recently the French Government converted a large number of two-seaters into school machines with dual controls. These machines are fitted with 80 h.p. Le Rhone engines.

The Sopwith "Pup"

This famous single-seater scout bears a strong family resemblance to the Sopwith "family," being reminiscent of both the 1½-Strutter and of the original "Tabloid."

manœuvrability, and the triplane principle was adopted to secure this purpose in consequence of the fact that, owing to the narrow chord, the shift of the centre of pressure with varying angles of incidence is relatively smaller than in a biplane, and consequently demands a shorter length of fuselage to carry the tail. At the same time the small span reduces the moments of inertia in the horizontal plane, and a machine is thus obtained which is highly



The Sopwith Dolphin with a 200 H.P. Hispano-Suiza Engine

The "Pup" was brought into existence principally with the object of tackling the Fokker monoplanes that were at one time doing far too well on the Western Front. In this object it succeeded admirably, and although judged by present standards it is of very low power—it was fitted with an 80 h.p. Le Rhone engine—its performance and ease of handling endeared it so much to its pilots that its merits are spoken of with much affection, tinged with a little regret that it has had to give way for higher-powered machines. A feature of the "Pup" are the window panels in the upper plane. The windows were rendered necessary by the fact that the pilot sat with his head below the level of the plane. A single machine gun firing through the propeller is mounted above the fuselage.

#### The "Pup" (Sea Type)

When starting from and alighting on the deck of a ship became the fashion, the Sopwith "Pup" was modified slightly for this purpose, and good work was done by this type on the North Sea patrols, for which work it proved very suitable. The "Pup" machine did not differ greatly from the standard type.

#### The Sopwith Triplane

Amongst all the Sopwith productions, nearly all of which have attained great fame, none is more characteristic than the triplane, affectionately known as the "Tripe" or "Tripehound." This machine was fitted with 130 h.p. Clerget engines. The principal objects aimed at in this notable design were, first, the attainment of a high degree of visibility, or, rather, the reduction to a minimum of the pilot's blind angle. With his head on a level with the intermediate plane, he enjoys a practically unrestricted arc of vision through about 120°, whilst sections cut out of the centre of the intermediate plane enable him to have a good view of the ground when landing, the position of the cockpit being such that the bottom plane has no restricting influence on the view. The narrowness of the chord made available by the use of three main planes also allowed the pilot an exceptional view upwards and to either side, an important consideration in a purely offensive machine. The second object aimed at was an increase in

responsive to its controls and which can add the important ability to dodge to its other strategic advantages. The consideration of movement of the centre of pressure enabled single I-struts to be adopted in place of the usual pairs springing one from each spar. This construction also leads to a sensible simplification of the wiring system. Ailerons of the unbalanced type are fitted to all three planes.

#### The Sopwith "Camel"

Few aeroplanes have done more to repulse German attempts at aerial supremacy than the famous "Camel," so called from the hump which it carries on the forward top side of its fuselage by virtue of the fitting of two fixed machine guns, both firing through the propeller. Furnished with a 130 h.p. Clerget, and designed to achieve a very high performance both in climb and speed, the "Camel" showed itself a redoubtable fighter against antagonistic scouts, and also performed extraordinarily well as a Zeppelin catcher, in which latter connection its ability to climb with great rapidity was extremely valuable. A good angle of vision was obtained by keeping the pilot fairly well forward, and also by the positive stagger of the planes. In place of the large transparent panels fitted in the middle of the top plane in the "Pup," that of the "Camel" was provided with a faired-off slot. The remainder of the designed followed "Pup" lines pretty closely, but it is of interest to note that this machine was the first to be fitted with two machine guns, a practice that has since been extensively adopted in both Allied and enemy aeroplanes of a similar type.

#### The Sopwith "Camel" (Sea Type)

This design was almost identical with the above, except that the fuselage was made detachable at the rear of the pilot's seat, enabling the machine to be conveniently stowed aboard ship. It was used for flying from the deck of seaplane carriers, and, in addition to this, was also carried on some of our fast cruisers. The method of launching was off the Barbet guns. It will be appreciated that it required a machine of considerable efficiency to get off with certainty and satisfaction with so short a run.

(To be concluded)

# THE VAN METER PARACHUTE RELEASING DEVICE

THE Van Meter Parachute release, the invention of First Lieutenant S. L. Van Meter, presents many features of interest to the parachute builder. It is designed to contribute two additional factors of safety to parachute jumping by, first, assuring the casting out of



The Van Meter Parachute Release is mounted in back of the pilot's seat inside of the fuselage

the parachute to a distance of several feet from the fuselage in order to eliminate the danger of entanglement with the empannage, and, second, by providing means of immediately opening the parachute, preventing the initial precipitate plunge and consequent strain, now present in parachutes. In addition, shock absorbing devices are provided to lessen the strain on the aviator after the jump, and means of tilting the seat back to permit the aviator being lifted out of the ship.

The object of this device is to instantly release the pilot of an aeroplane from his seat and, at the same time, to cast a fullsized parachute twenty feet or more clear of aeroplane, before parachute is permitted to open. In order to enable parachute to be cast through slip-stream, and to insure that it completely clears all parts of the ship before opening, the parachute is enclosed in an aluminum container which, either by means of a spiral spring or compressed air, is thrown about twenty feet from an aeroplane, when aluminum container falls completely apart and releases parachute. Parachute is then instant-Iv opened by means of a simple device consisting of loop shaped springs attached to its mouth. These springs fall free of parachute the instant the parachute is completely open. To insure pilot easily being pulled clear of ship a chute or slide-way is installed immediately to the rear of pilot's seat.

In case the pilot wishes to use parachute

when the ship is falling at a very high rate of speed, means are also provided for absorbing the shock imparted to the body of the pilot when the parachute has caught the air

In 1910 and 1911 Lieut. Van Meter developed a jump chute to be used from an aeroplane, and filed patent application on same. In 1911 he came to Dayton in order to take up with the Wright people the equipping of their pilots with the jump chute. After doing a little flying and going over the matter carefully with them, it was decided that a jump chute was not practical, and that, in order to use a parachute from an aeroplane, it would be necessary to install some means of automatically casting the parachute completely clear of the ship before the parachute was allowed to open. Lieut Van Meter therefore immediately began work on a launching device, and abandoned the jump chute. The development of an automatic launching device was undertaken with the following problems in mind:

- (a) In case of a tailspin, side-slip or vertical nose-dive, jump chute very easily becomes entangled in the tail or some other part of the ship; therefore parachute must be cast completely clear of aeroplane before opening.
- (b) In case pilot is wounded in legs or arms, it is very difficult to unstrap safety belt and jump clear of ship. He should be automatically released from seat and pulled clear of ship when parachute opens without any physical effort on his part.
- (c) The jump chute is strapped directly to the pilot's back. A pilot is considerably hampered by having this weight on his back, especially if he were fighting. When launching device is used, pilot is left free and unencumbered.
- If it is intended to equip primary training aeroplanes with parachutes, a launching device is desirable, as it operates almost instantly and could be used successfully within one hundred feet of the ground; whereas with a jump chute it takes several seconds to unfasten safety

belt and jump clear of the ship, and then several seconds more before parachute opens and checks the fall of the pilot sufficiently to prevent serious injury. Also, a cadet often loses control of himself upon falling into a tailspin and in such cases has not sufficient presence of mind to release himself and jump clear of the ship, especially if he is near the ground; whereas with launching device a slight full on the release ring opens parachute and pulls cadet free of the ship almost instantly.

When using this launching device, pilot remains in his ship until parachute is completely open, and is supporting his weight sufficiently to pull him clear of ship. If parachute is open sufficiently to lift the pilot clear of ship it stands to reason that it will also support him safely to the ground. On the other hand, employing a Van Meter parachute if the parachute fails to open, the pilot still remains in the aeroplane. With jump chutes the pilot jumps clear of the chip to start with, then if for any reason parachute fails to open, he has neither ship nor parachute to support him.

An examination of the method of mounting this parachute on the aeroplane reveals that it takes no room in the fuse-lage which might be otherwise utilized, and that it does not offer any additional resistance to flight. When development is completed, the overall weight of the device will be well within thirty pounds. Any standard type of parachute may be utilized

In official sand bag tests, with the plane in straight-away flight it was observed that after the parachute had been shot out the full distance and the cords to the sand-bag stretched tight, the parachute stands out at an angle of 80 degrees. The parachute then took a short sweep down, snapped open and pulled the sandbag out at about 35 to 40 degrees.

This development is of interest for it is certain that the ultimate parachute will launch above the plane out of the way of the tail, even in case of a spinning nose dive. Lieut. Van Meter is protected by broad patents.

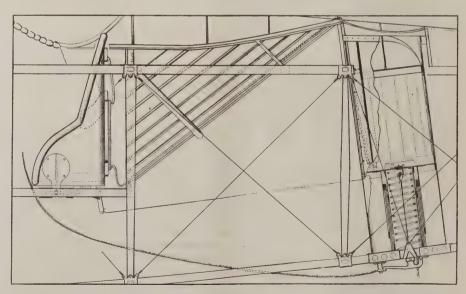


Diagram of Van Meter Parachute Release, showing the chute through which the aviator is lifted and the control rope at the pilot's seat

# THE **U.S. NAVY B-CLASS** DIRIGIBLE



HE Navy Department's "B" class non-rigid dirigibles were designed for use in connection with coast or harbor patrol, to be operated from a base on shore, but it is pastrol, to be operated from a base on shore, but it is possible for them to rest upon the surface of the water in good weather. The following specifications, given out before the airships were built, give an indication of their requirements and structure. The accompanying line drawings and photograph show the "B" class dirigible as it was actually

The non-rigid envelope is made of rubberized fabric and contains hydrogen under sufficient pressure to maintain the rigidity of the envelope. Attached to the envelope are vertical and horizontal pins, rudders, elevators, mooring lines, dip panels, manoeuvering and safety valves, internal air sacks

with means for their inflation.

Fully inflated the displacement of the envelope is about 77,000 cubic feet, which corresponds to a gross buoyancy of 5,275 pounds when inflated with hydrogen of good commercial conditions of barometer and temporary of barometer and temporary conditions of barometers. purity and under normal conditions of barometer and tem-perature, under which conditions the lift is calculated to be

0.068 lb. per cubic foot at 150 centigrade and 760 mm.

The length of the envelope is 160 feet and the maximum diameter 31.5 feet. The center of gravity is 69.2 feet from

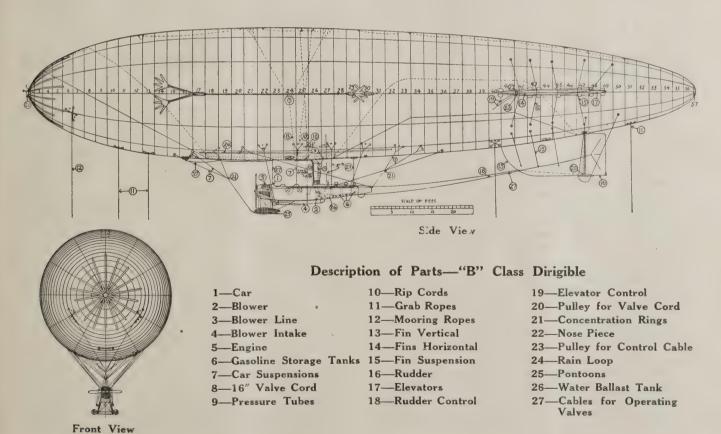
the nose and the center of buoyancy 4.75 feet aft of the cen-

ter of gravity.

The engine is 100 H. P. Curtiss OXX-3, driving a tractor propeller 8 feet 6 inches in diameter. Maximum speed at 600 feet, 45 m. p. h.; endurance at full speed, 10 hours; at cruising speed (35 m. p. h.), 16 hours. Tank capacity 100 gallons. Full weight, 600 pounds.

The articles of equipment and outfit installed on the B class airships include the following: Tachometer, gasoline air pressure gage, circulating water and lubricating oil thermometers, oil pressure gage, longitudinal inclinometer, map boards, mooring rope, two gas pressure manometers, one balloonet air pressure manometer, altimeter, statoscope, compass, air-speed meter, fire extinguisher, searchlight, 250-lb. radio outfit.

The water ballast tank, located in the body, has a capacity of 300 lbs., and is provided with means for rapid discharge. of 300 lbs, and is provided with means for rapid discharge. In addition to trimming the dirigible my manipulation of horizontal rudders or shifting air between balloonets, small water containers are placed near the bow and stern of the envelope, fitted with spring-loaded valves, which are operatable from the pilots' seat. The forward tank contains 40 lbs. of water and the after tank 50 lbs. Tubes lead discharge from each tank to main ballast tank.



# HEAT TREATMENT OF STEEL USED FOR AERO ENGINES

By ALBERT SAUVEUR, S. B.\*

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N heat treating rolled or forged steel we seek generally: 1. To increase its softness, that it may be more readily machined:

2. To make it strong, that it may resist successfully the stresses to which it will be subjected in use;

3. To make it hard, that it may resist wear or acquire cutting properties.

The corresponding heat treatments may be therefore described respectively as:

# A.—Softening Treatment B.—Strengthening Treatment C.—Hardening Treatment

The Softening Treatment, which usually consists in cooling the metal slowly from a temperature exceeding its critical range, generally imparts to it its maximum ductility but materially reduces its strength (and elastic limit).

It is also highly beneficial in removing the strains resulting from the working of the metal. These strains are the more serious and detrimental the lower the temperature at which the metal was worked. If it has been cold worked, the necessity of removing them becomes imperative, as a strained metal is a dangerous one, inclined to be brittle and having reduced resistance to shock and to fatigue stresses.

The Strengthening Treatment implying, as it generally does, a rapid cooling from a temperature but slightly above the critical range of the metal, is not as effective as the softening treatment in removing working strains. It follows from these considerations that it is often advisable to subject to a softening treatment certain steel objects already soften and the base of the mought to be readily machined or which are to be subjected. enough to be readily machined or which are to be subjected to a strengthening treatment, for the purpose of removing thoroughly the objectionable strains created by the working operation.

The softening treatment should be logically applied after

rolling or forging but before machining.

strengthening treatment consists usually in cooling

The strengthening treatment consists usually in cooling rapidly through the critical range and may be followed, as later explained, by a second heating below that range. Roughly speaking, the strength imparted will be the greater, the quicker the cooling through the range. Increased strength moreover generally implies increased elastic limit, a property which is in reality of greater moment than mere tenacity, for, obviously, it is not intended that steel parts should ever be strained above their elastic limit, that is, until permanent distortion actually occurs

tortion actually occurs.

The strengthening treatment, on the other hand, generally decreases the ductility of the metal and may result in actual brittleness. Broadly stated, the greater the increase of strength, the greater generally the decrease of ductility, that is, the greater the danger of producing a brittle metal; hence is, the greater the danger of producing a brittle metal; hence the necessity, in most cases, of being satisfied with such strengthening treatment as will yield, not maximum strength, but such strength as can be combined with the amount of ductility necessary for safety, that is, to guard us against sudden rupture under shock. If, for instance, the cooling through the range has been so rapid as to yield very great strength but very little ductility, a second treatment will be required in order to increase the ductility, while necessarily decreasing the strength decreasing the strength.

The rapid cooling through the range which the strengthening treatment generally implies is, moreover, beneficial in destroying, in part at least, the structural orientation generally imparted to steel by work. An objectionable effect of this orientation is to cause the metal to acquire physical properties when tested in the direction of the work markedly different from those it possesses when tested at right angle to that direction. In the former case, for instance, the ductility as measured by the elongation is, as a rule, considerably greater. This implies a lack of physical or structural homogeneity obviously undesirable.

Again, the strengthening treatment generally increases in a marked degree the hardness of the metal, and hence, imparts to the treated parts greater resistance to wear. softness, then, cannot be generally combined with strength, nor great strength with much ductility. Softening and strengthening treatments must necessarily be distinct and generally of opposite nature, the former implying slow cooling through the critical range, the latter a more rapid cooling. Moreover, the maximum strength the metal is capable of acquiring can seldom be utilized because of the lack of ductility, if not actual brittleness, which accompanies it.

The strengthening operation must be so conducted as to yield such combination of strength and elastic limit with ductility, as will meet the requirements of the case.

The Hardening Treatment, like the strengthening treatment, consists in cooling rapidly through the critical range.

In hardening steel, however, the primary requirement is to produce very great hardness, while overlooking the decrease of ductility implied. Indeed, as a rule, we use all possible means to hasten the cooling because of the greater hardness resulting.

Even when implements are to be hardened and thereby deprived of much of their ductility, a softening treatment preceding the hardening treatment may often be applied with beneficial results because by more thoroughly removing the forging or rolling strains it will diminish the danger of cracks occurring during the quenching in the subsequent hardening treatment.

The rational methods of conducting these three treatments may now be briefly described.

#### A .- Softening Treatment

Purpose.—To soften the metal in order to facilitate machining; also to remove the strains produced by forging or rolling.

When to Apply.-After forging or rolling, but before ma-

chining.

Description.—(a) Heating the steel to 900° C. (1652° F.), maintaining that temperature for 30 minutes or more, cooling slowly, for instance with the furnace in which the steel was heated. (b) Heating to some 600-675° C. (1112-1247° F.) for several hours, cooling very slowly. (c) Heating to some 800-850° C. (1472-1562° F.), quenching in oil, then treatment b.

Treatments (b) and (c) are applicable to steels containing 0.8 per cent. carbon or more, and to some alloy steels which are not readily softened by treatment (a).

#### B .- Strengthening Treatment

Purpose.—To increase strength and elastic limit at the sacrifice of some ductility; also to increase hardness, and, in some cases, resistance to shock and to fatigue stresses and to decrease structural orientation.

When Applied.—Generally after machining in the case of

When Applied.—Generally after machining in the case of machined parts; after forging, rolling or stamping, if the objects are not to be machined.

Description.—(a) Heating to 50° C. (90° F.) above the critical range of the steel, cooling freely in air. Steels containing less than 0.25 per cent. carbon may be quenched in oil, those with less than 0.15 per cent. carbon in oil or in water. (b) Heating to 50° C. (90° F.) above the critical range of the steel; quenching in water or oil (the former for low carbon steel), re-heating to 50° C. (90° F.) or more below the critical range, cooling in air, oil or water.

for low carbon steel), re-heating to 50° C. (90° F.) or more below the critical range, cooling in air, oil or water.

The rate of cooling from a temperature inferior to the critical range does not generally affect the properties of steel very materially; at least its tensile properties. The higher the temperature of the second heating the less tena-

cious and more ductible the metal.

Some nickel-chromium steels, however, show very low shock strength under impact testing after heating to some 600° C. (1112° F.) followed by slow cooling as compared to 600° C. (1112° F.) followed by slow cooling as compared to their shock strength after quenching from that temperature.

While treatment (a) often yields satisfactory results, treatment (b) affords a means of securing greater strength, as well as many different combinations of strength and ductility to meet different requirements. The steels so treated, especially certain alloy steels, are generally also more resistant to shock and to fatigue stresses. There is little if any advantage, however, in applying treatment (b) in preference to treatment (a) to carbon steels containing less than 0.25 per cent. carbon.

#### C .- Hardening Treatment

Purpose.—To produce very great hardness while sacrificing ductility to the point of brittleness.

When Applied.—To finished parts, as a last treatment, or to be followed by grinding only.

Description.—Heating to 50° C. (90° F.) above the critical range of the steel, cooling rapidly in water or oil, generally re-heating to 200-400° C. (392-732° F.), an operation known as tempering, which is applied in order to remove or decrease as tempering, which is applied in order to remove or decrease

<sup>\*</sup> Reprinted from the Journal of the Franklin Institute.

the severe strains created by the sudden cooling while losing but little hardness and to decrease brittleness. The higher the tempering temperature, the greater the softening effect

of the operation.

The three basic heat treatments described above are applicable to alloy steels as well as to carbon steels, bearing in mind the marked influence of some elements on the position of the critical range. Some special steels, for instance, should be heated, for the purpose of strengthening or of hardening, to temperatures considerably lower than those suitable for carbon steel, because of the lower position of their critical range. The character of the operation, however, remains the

Classification of Steel According to Heat Treatment Required.—According to the heat treatments required, steels may

be classified as follows:

(1) Steels soft enough to be readily machined and strong enough for the stresses to which they will be subjected in service. Heat Treatment Required.—None.

(2) Steels soft enough to be readily machined, but lacking in strength or in hardness. Treatment to be Applied.—Strengthening treatment (a) or (b) generally after machin-

ing, and, for hardness, hardening treatment.

(3) Steels not soft enough to be readily machined but strong enough for the uses to which they are intended. Treatment to be Applied.—Softening treatment (a), (b) or (c) followed, generally after machining, by strengthening treatment (a) or (b), because the softening treatment will generally deprive the steel of much of its strength, which must

then be restored.

(4) Steels neither soft enough to be readily machined nor strong enough to resist stresses in service. Treatment Required.—Softening treatment (a), (b) or (c) followed, generally after machining, by strengthening treatment (a) or

It will be noted that steels of classes 3 and 4 call for

similar treatments.

(5) Steel parts which should be very hard must be treated by the hardening treatment unless they already possess great hardness, such as manganese steel and air or self-hardening steels, which will be considered later.

As already stated, it is beneficial to subject to a preliminary softening and strains-removing treatment steel parts to be

When for economical or other reasons it is advisable to subject forged or rolled carbon steel to but a single heat treatment, cooling in air from a temperature of some 800-900° C. (1472-1652° F.), according to its carbon contents, is 900° C. (1472-1652° F.), according to its carbon contents, is generally to be recommended, because such treatment (1) leaves the steel in a condition generally soft enough to permit its ready machining (unless it be very high in carbon), (2) removes, in part at least, the working strains, (3) obliterates, or at least, mitigates, the structural orientation and (4) yields a fair proportion of the strength combined with a large proportion of the ductility which the metal is capable of accounting able of acquiring.

#### Heat Treatment for Case-Hardened Parts

Case-hardened parts generally require:

1. A strengthening and toughening treatment for the core consisting in quenching from 900 to 950° C. (1652-1742° F.)

followed by

2. A refining and hardening treatment of the case consisting in quenching from a temperature some 50° C. (90° F.) above the critical range, which for carbon steel would be in the vicinity of 800° C. (1472° F.). Special steels with lower critical range should, of course, be quenched from correspondingly lower temperatures. For nickel and nickel chromium steels, single quenching from some 800° C. (1472° F.) is often sufficient. After quenching for hardening the case is often sufficient. After quenching for hardening the case the parts may be tempered at some 200-300° C. (392-572° F.) in order to diminish the strains and the brittleness of the

There are a few instances of special steels demanding treatments from those applicable to all other steels. These exceptions should be briefly mentioned:

Manganese Steel.—A steel very hard and wear-resisting, even after slow cooling. To make it ductile, however, it should be heated to 1,000° C. (1,832° F.) or thereabout and

quenched in water.

Self- or Air-hardening Steels.—These steels become intensely hard on simple air cooling from a temperature of some 800 to 850° C. (1,472-1,562° F.). They do not therefore need any hardening treatment and they may be softened by softening treatment (b).

High-speed Steels.—These steels, in order to acquire their

remarkable physical properties, must be heated to a very high temperature approaching the melting point of the metal

and quickly cooled in air or in oil. They may then be tempered at a temperature not exceeding generally 600° C. (1112° F.). To soften these steels, in order to machine them, they may be heated to 750-850° C. (1,382-1562° F.) for several hours and very slowly cooled.

High Nickel Steels.—That is, those containing 25 or more per cent, nickel, are softened by quenching.

# Application of the Foregoing Considerations to the Heat Treatment of the Steels Used for the Construction of Aero Engines

Adopting the classification of the steels used in the construction of aero engines, proposed in previous reports (Bulletins M1 and M4) the heat treatments they should receive may be inferred from the rules just outlined:

#### Steel Type I.

Medium-hard carbon steel containing from 0.30 to 0.40 per cent. carbon. In its forged, rolled or stamped condition, this steel is soft enough to be machined. It may be nevertheless subjected to a softening treatment with beneficial results for the purpose of removing the working strains as previously explained.

With that end in view, it should be heated to 900° C. (1,652° F.), kept at that temperature for 30 minutes or more, and cooled slowly. This treatment should be applied logically before machining.

After machining, and in order to increase their strength and elastic limit as well as their resistance to shock, to wear, and to faitgue stresses, the parts should be subjected to strengthening treatments (a) or (b), bearing in mind that treatment (b) will yield better results than treatment (a) and will make it possible to obtain various combinations of strength and ductility to meet various requirements.

For treatment (a) heat to 850° C. (1,562° F.) and cool freely in air. For treatment (b) heat to 850° C. (1,562° F.), quench in water or oil, reheat to 450-650° C. (842-1,202° F.), according to requirements, and cool slowly or in water or oil.

#### Steel Type II.

Low carbon steel suitable for case hardening, containing from 0.05 to 0.15 per cent. carbon. This steel in its forged, or rolled condition can be very readily machined, but it nevertheless may be subjected to a softening treatment, in order, as previously explained, to remove working strains. With that end in view, the steel should be heated to 950° C. (1,742° F.) for 30 minutes, or more, and cooled slowly. This should logically be done before machining.

The case-hardened parts should then be reheated to 900° C. (1,652° F.) and quenched in water or oil, in order to strengthen and toughen the core. They should then be heated to 800° C. (1,472° F.) and again quenched in water or oil, in order to refine and harden the case.

They may, as a last treatment, be heated in oil to 200-300° C. (352-572° F.), in order to decrease the strains and brittleness of the case.

#### Steel Type III.

Low carbon nickel chromium steel, suitable for case-hardening, containing: Carbon not over 0.15 per cent.; nickel not less than 2 per cent.; chromium not less than .50 per cent.; and total nickel and chromium between 2.50 and 4 per cent.

While in its forged or rolled condition this steel can be easily machined, the softening treatment may be applied to remove working strains. This should be done before machining, by heating to 900° C. (1,652° F.) for 30 minutes or longer, and cooling slowly.

The case-hardened parts should be:

1. Either heated to 800° C. (1,472° F.) and quenched in oil or water to refine and harden the case, or, 2, heated to 900° C. (1,652° F.) and quenched in order to refine and strengthen the core, followed by heating 775° C (1,472° F.) and quenching to refine and harden the case.

After the last quenching the parts may be tempered by heating in oil at 200 to 300° C. (392-572° F.) to diminish the strains and the brittleness of the case.

#### Steel Type IV.

Medium-hard nickel-chromium steel containing: 0.30 to 0.40 per cent. carbon; 2.50 to 3.50 per cent. nickel; 0.50 to 1 per cent. chromium; 3 to 4 per cent. total nickel and carbon.

This steel can be machined in its forged or rolled condition, but a softening treatment will increase the ease of machining and will be beneficial in decreasing the strains caused by work.

For this treatment, which should be logically applied before machining, the steel should be heated to 850-900° C. (1,562 to 1,652° F.) for 30 minutes or more, and slowly cooled.

The machined parts should then be subjected to a strengthening treatment consisting in heating to 800° C. (1,472° F.), followed by air cooling or preferably to the double treatment consisting in heating to 800° C. (1,472° F.) and quenching in water or oil, followed by reheating to 400 to 650° C. (752 to 1,202° F.) according to requirements, and quenching in oil or water.

#### Steel Type V.

Air-hardening nickel-chromium steel, containing: 0.30 to 0.50 per cent. carbon; 3.00 to 4.50 per cent. nickel; .50 to 2.00 per cent. chromium; and total nickel, chromium and carbon, not less than 5 per cent.

In its forged or rolled condition, this steel is difficult to machine. It should be subjected to softening treatment (b).

The machined parts should then be either cooled freely in air from a temperature of 850° C. (1,562° F.) or quenched in oil from 800° C. (1,472° F.) and reheated to 300-600° C. (572-1,112° F.) according to requirements. Air cooling suffices, however, to impart great hardness and great strength to this steel.

#### Steel Type VI.

High speed steel, suitable for exhaust valves. To soften this steel in order to permit a small amount of machining, it may be heated to 750.850° C. (1,382-1,562° F.) for several hours and cooled very slowly. The valves should then be subjected to the heat treatment generally applied to high speed steel, namely:

Heating to a temperature of some 1,200° C. (2,192° F.) and cooling in air or in oil. This may be followed by reheating to 500.600° C. (932-1,112° F.).

## THE WEATHER BUREAU AND AERONAUTICS

T has been the continuous aim of the Weather Bureau during the past 48 years of its existence to make its service of the greatest possible value to all the people, not only in a general way, through the dissemination of forecasts and weather information by means of the telegraph and telephone, but rendering its warning advices and information directly to special interests and

individuals benefited thereby.

Created by a Joint Resolution of Congress approved in February, 1870, for the benefit of Commerce, Agriculture and Navigation, the Bureau has grown steadily to a great and beneficial public service, extending its work with the growth of the Nation and expanding to serve every new activity or situation dependent upon or influenced by the weather. At the present time it maintains over 200 fully equipped meteorological stations, and about 1,400 substations classified as special meteorological, river, storm warning, hurricane, marine, cotton region, corn and wheat region, fruit, cranberry, and fire-weather warning stations. In addition to these the Bureau maintains, in connection with its climatological work, about 4,500 stations known as cooperative tions, the equipment being furnished by the Bureau and the observations being taken by public spirited citizens who render gratuitous service. Its cooperative work extends to practically every ocean of the globe, and the masters of many vessels (the number was greatly reduced by the war, but is now on the increase) fill out forms of daily meteorological observations on every voyage, to be forwarded on arrival in port. Before the on arrival in port. war daily receipt by cable and otherwise from selected stations over the entire Northern Hemisphere were collected and published. Negotiations to restore this exchange are under way. A highly trained, efficient and experienced personnel of over 800 commissioned employees helped by about 1,400 who receive a small compensation for the regular performance of specific duties, conducts the work of the Bureau, and in addition the marine and cooperative observers constitute a host of nearly 6,000 public-spirited individuals who serve gratuitously. Such, in brief, is the machinery and organiza-tion of the Weather Bureau. While the Bureau is best known to the

public through the issue of its daily fore-casts, maps and bulletins, there is no doubt that its greatest value in an economic sense consists in the immense saving effected by its special warnings as of storms and hurricanes for the benefit of marine interests, warnings of floods that occur on the principal rivers, warnings of cold waves which accomplish protection to property and foodstuffs liable to damage by injuriously low temperatures, warnings of frosts and freezing weather for the benefit of the fruit, sugar, tobacco, cranberry, market gardening, and

other interests.

sobriquet of earlier days, Probabilities," is expressive of the sense of humor with which the kindly public received the forecasts and warnings. Many a sad fatality has taught wisdom and transformed humor to respect. Many now eagerly seek and heed weather advices and manage business affairs Cases are of record where the courts administered severe reprimands to masters of vessels, and their owners were compelled to pay damages, for failure to heed Weather Bureau warnings.

To issue storm and weather warnings for navigation (marine) was by law one of its first duties. Its issue of warning advices and information for the navigation of the air is but one among other extensions of its work brought logical about chiefly by the war. As early as 1898 the Bureau began the taking upper air observations, and work of this character has been carried on almost continuously since 1907. The data derived have been of great value in connection with aviation and the carrying on of military operations, and Congress readily granted the funds needed to enlarge the service to supply the needs of the Army and Navy in carrying on the war. Abreast with the need, a service of advices, forecasts and warnings in aid of aeronautics has been created in the Weather Bureau; it has been in operation since December 1, 1918, and is offered and available to those who may be benefited by it. It is limited as yet in both funds and personnel, but Congress will doubtless make other provisions as needs develop. The service already performed in the past few months illustrates its operation and testifies to its worth.

When the first transatlantic airship flight was projected by the U. S. Navy the need of accurate meteorological re ports of surface and upper air winds and their attendant weather, such as clouds, fog, and visibility, was early seen, and their importance in such an undertaking fully recognized. As the Weather Bureau was the logical organization on this of the Atlantic Ocean capable of handling a project of this importance and its aid was sought magnitude, Navy Department in supplying the meteorological information and forecasts

teorological information and forecasts needed by the aviators making this flight. The plans proposed by the Weather Bureau were found acceptable, and it was charged with the responsibility of making the forecasts for the guidance of the aviators from the time\_they left Rockaway to the time they reached the Azores.

Active military operations are now happily over. Civil aerial transport exists and commends attention. Few are bold enough to guess perhaps what is before us, but foreknowledge of weather conditions is vital to the successful navigation of the air and the conservation of

life and property.

Another example of the importance of meteorological information and forecasts to aerial navigation is that in connection with the recent visit of the British dirigible, the R-34, to our country. call for meteorological information and forecasts was received from the com-mander of this airship when off Newfoundland, and was by radio through the shore station at Cape Race. Immediately on the receipt of this call information of the prevailing weather and winds along the American coast north of New York and forecasts of wind and weather conditions were sent twice each day until the airship reached Long Island. Perhaps the most important information contained in these advices was sent when the air-ship was flying between Nova Scotia and Cape Cod, encountering head winds and its supply of fuel nearly exhausted. The its supply of fuel nearly exhausted. prediction was to the effect that the wind would change to the northeast within the next twelve hours. Unquestionably this change in wind was most timely and enabled the airship to reach its destination without the aid of torpedo boats. During all the time that the R-34 was moored

at the flying field on Long Island advices three times each day concerning the probable wind and weather conditions were supplied its commander. Its dramatic departure was made on urgent advices from the Weather Bureau to the effect that a storm was approaching rapidly from the region of the Great Lakes, that the wind and weather conditions, then favorable for a start homeward, would continue but a few hours longer, and that to remain moored on the flying field would be at the risk of having the airship torn from its moorings and swept away by winds and squalls that would set in before the expiration of the night. This bulletin was sent as an urgent message at 9 p.m., and at midnight the R-34 was on her homeward flight under exceptionally favorable wind and weather conditions. It is fortunate that she left when she did, for the following morning the wind was blowing half a gale, rain had set in, and atmospheric conditions were most dan-gerous for an airship unprotected on a flying field. In the meantime the R-34 was miles eastward, flying in good weather and with strong following winds, making exceptionally fine speed. That the work of the Weather Bureau in this connection was appreciated is evidenced by the following radio message received from her meteorological officer after her departure: "Many thanks for kindly and efficient manner in which weather information has been supplied. Very grateful.

These are but examples of what the Weather Bureau will and must do for aerial navigators in the future, not only in the matter of transatlantic flights, but more particularly to safeguard flying in

the United States. The Weather Bureau has for some time past made forecasts for the air services of the Army and Navy, and in the imme-diate future this service will be enlarged

and standardized.

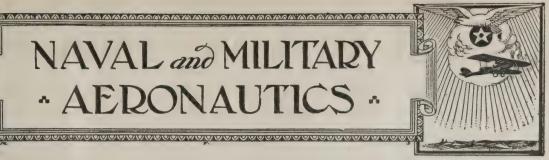
After August 10, 1919, "flying weather" forecasts will be made systematically for the United States by zones as follows: No. 1, North Atlantic States; No. 2, Middle Atlantic States; No. 3, South At-Middle Atlantic States; No. 3, South Atlantic States; No. 4, Lake Region; No. 5, Ohio Valley and Tennessee; No. 6, East Gulf States; No. 7, Upper Mississippi and Missouri Valleys; No. 8, Central Plains States and Middle Mississippi Valley; No. 9, West Gulf States; No. 10, Northern Rocky Mountain States; No. 11, Southern Rocky Mountain States 11, Southern Rocky Mountain States; No. 12, Southern Plateau States; No. 13, Pacific Coast States.

The zonal map herewith shows the geographic districts into which the United States have been divided for the purpose of aviation forecasting. These forecasts of aviation forecasting. These forecasts will be issued twice daily, at 9:30 a.m. and 9:30 p.m., and will be immediately supplied the Air Service, U. S. Army for dissemination to their airfields. It is presumed that the U. S. Naval Air Service will sooner or later need similar information for the coastal zones. It also seems probable that the press services will handle the forecasts for distribution to the regions where flying is more or less general, for it is manifestly true that meteorological information and forecasts are destined to become of even greater importance to the navigator of the air than to the navigator of the seas or the dweller on the lands.

The Weather Bureau through its chain of meteorological reporting stations and its trained personnel is at attention and prepared to handle the many problems that will have to be handled to save the lives and the ships of the air as it has saved the lives and ships at sea during the year since Congress planned and legalized its organization for this purpose. will sooner or later need similar infor-



# NAVAL and MILITAR AERONAUTICS



#### All Plane and Engine Production Completed

Washington, D. C.—According to a compilation prepared by the Statistics Branch of the General Staff, except for

Type Nov. 11

Planes
SJ-1, training 1,600
Penguin, training 300
S4B, training 100
SE-5, service 1
Handley-Page, service 101
IN+-D, training 3,746
INH, training 1,690
S4C, training 372
De Haviland 4, service 3,431\*\*
Le Pere, service 7
E-1, training 12

Total
Engines
A7A, 100 H.P., training.
Lawrence 28 H.P. training.
Gnome 100 H.P. training.
Hispano 150 H.P. training.
OX-5, 90 H.P. training.
Liberty 12 (Navy) service.
Liberty 12 (Navy) service.
Le Rhone 80 H.P. training.
Hispano 180 H.P. service.
Bugatti, 452 H.P. service.
Hispano 300 H.P. service.
Liberty 8 (Army) service.

two De Haviland 4 planes, all production of planes and engine has been com-pleted on August 30. The following are the figures for production of all types both before and after signing the armis-

Total

4.092 4,846 128

13,660

451 280

41,264

3.346

116

32 492

11,416

2,300

Per cent. delivered Before Since Armistice Armistice

83

0

13 Per Cent of Air Service Overseas Washington, D. C.—The following table shows the distribution of the total commissioned and enlisted strength of the Air Service as of August 7:

Flying fields 7,734 Depots & demobilization camps. 3,955 Repair depots	Per-cent % of total 44 23 5 4 3 3 5 5
Total U. S. & Possessions15,260 A. E. F	87 13

#### Universal Military Service Urged

Washington, D. C.—The War Department proposed a system of universal military training in its proposals to the Congressional Military Committee. calls for a regular army of 510,000 men, a war strength of 1,250,000, to be obtained by a selective service act. For training purposes all youths of 19 years of age shall serve for three months with the regular force, during which they will receive intensive military training stripped of all vocational and educational features. (Continued on page 28)

#### U. S. Army Training Sixteen Aviators

\*Also 56 SE-5s sent from England and equipped here. \*\*Includes 204 DH-4s, without engines, used as spares

Washington, D. C .- An official announcement from the Statistics Branch of the General Staff states that during the week of August 21 the Air Service had eleven student officers and five enlisted of 204 hours flown, or 12.75 hours per man in training, as compared with an average of less than three hours flown per man during the latter part of 1918.

#### J. G. Vincent Commissioned Colonel in Signal Officers' Reserve Corps

Detroit, Mich.—J. G. Vincent, formerly a lieutenant colonel in the army and codesigner of the Liberty engine, has been commissioned a colonel in the aviation section of the Signal Corps on flying

#### Liquidation of Aircraft Contracts

Washington, D. C.—The value of uncompleted portions of suspended contracts for the Air Service is \$532,268,000. Of this 53 per cent, or \$284,229,000, was liquidated on or before August 2, according to an official statement issued by the Statistics Branch of the General Staff

#### Discharge of Commissioned Officers

Washington, D. C.—The Statistics Branch of the General Staff reports that Branch of the General Staff reports that of the 1,870 officers on duty with the Bureau of Aircraft Production on November 11, 1,505, or 80 per cent, have received their discharge; 15,287, or 79 per cent, of the 19,378 officers of the Department of Military Aeronautics had on August 20 received their discharges.

#### OFFICIAL LIST OF BRITISH DECORATIONS TO AMERICAN AIRMEN

London.-The Air Ministry issued on July 12 the following list of officers of the United States Air Service who have been awarded medals or received citations in connection with the war:

His Majesty the King has been pleased to confer distinctions specified on the undermentioned officers and other ranks of the United States Forces, in recognition of distinguished services rendered in connection with the war:

Honorary Companionship of the Most Honorable Order of the Bath, Military Division (C.B.).

Major General William Lacey Kenly, Director of Aeronautics, United States Aviation Service, Washington.

Distinguished Order of St. Michael and

St. George (C.M.G.).
Major Harold Fowler, D.S.O., M.C.,
Liason Officer between the Royal Air
Force and the United States Services in

Brigadier General George Sabin Gibbs, Assistant Chief Signal Officer, United

States Signal Service, France.
Colonel Walter Kilner, United States
Army and Aviation Service (Washing-

Brigadier General William Mitchell, Assistant Chief of United States Avia-

tion Service, France.
Colonel Arthur Woods, Assistant Director of Aeronautics, United States Aviation Service, France.

(Continued on page 28)



An F. K. 27 sporting biplane manufactured by the British Aerial Transport Company



#### **FOREIGN NEWS**



#### Base for Airships at Queenstown Proposed

Queenstown, Ireland.—A proposition to establish an aerial base at Queenstown where passengers traveling by airship from the United States may alight has been received by the urban district council here, and help is promised for the project. The plans contemplate a station to accommodate an airship carrying 150 persons besides the crew.

It is also intended to establish a service of smaller airships carrying fifty persons for the distribution of passengers to Dublin, Liverpool, Manchester, York, Hull, Norway and Denmark.

## Caproni Plane Carries 15 Passengers from Milan to Turin in 2 Hours

Milan.—A Caproni passenger-carrying plane recently carried fifteen passengers and two pilots between Milan and Turin in two hours. This is a record for the journey.

#### French Seaplanes Penetrate 1,000 Kilometres Up African River

French Seaplanes Penetrate 1,000 Kilometres Up African River
Dakar.—Successful exploration by two Donnet-Denhaut hydroaeroplanes powered by 200 horsepower Hispano-Suiza engines between
April 12 and 25, offers an excellent example of the utility of aircraft
in the exploration of tropical countries. Under the command of Lieur
tenant Lefranc, commanding officer at the Dakar naval aviation station,
with 2nd Master Mechanic Ronhaud as mechanic, started on April 12
from Dakar, arriving at St. Louis, at the mouth of the Senegal River,
167 km. distant, in 2 hours 50 minutes. The second plane, in charge
of Ensign Montrelay, and 2nd Master Mechanic Hartmann, started at
the same time, but did not complete the return journey owing to engine
trouble.

The following is the log of the flight:

Kilometres	Flying time
Dakar-St. Louis 167	2 hrs. 5 min.
St. Louis-Podor 267	3 hrs. 20 min.
Podor-Kaedi 262	2 hrs. 23 min.
Kaedi-Bakel 262	2 hrs.
Bakel-Kayes	1 hr. 22 min.
Return journey	
Kayes-Bakel	1 hr. 11 min.
Bakel-Kaedi 262	2 hrs. 48 min.
Kaedi-St. Louis 532	3 hrs. 23 min.

The superiority of the flying boat, both in speed and comfort, for purses of exploration is conclusively demonstrated in this excellent flight.

#### Commercial Air Services in Tunis Expanding

Commercial Air Services in Tunis Expanding
Tunis.—The French Government is expanding facilities for commercial air traffic in Tunis by utilization of her military aeronautic personnel still on active service here. A regular aerial mail line between Gabe's and Ben-Gardane, a distance of 400 kilometres, is in operation Trials of other routes soon to be placed in operation are being made, including a line between Tunis and Palermo, Tunis-Cairo, Tunis-Malta, Tunis-Tripoli, Tunis-Tangiers and Tunis-Nice via Ajjacio.

A large and active aerodrome is established at Kassar-Said, near Tunis, which comprises a veritable aeronautic university, with its hangars, construction shops, laboratories, repair shops, supplies, and employs a skilled staff of 300 mechanics and helpers. Another model aerodrome is established at Sedjoumi.

#### Five Air Lines Planned in Balkans

Paris.—A commission is investigating the credits necessary for the establishment of several French commercial air nlies to be established in the Balkans, according to L'Aerophile.

The following are the proposed routes:
Constantinople-Smyrna-Greek Archipelago.
Constantinople-Palestine-Mecca-Egypt.
Constantinople-Pucharest-Southern Russia.
Constantinople-Bucharest-Southern Russia.
Constantinople-Salonika-The Balkans.

#### Vickers Service to Rotterdam

London.—Vickers, Ltd., will shortly inaugurate a service to Rotter-dam for carrying mail and passengers. Two, three and twelve passen-ger machines are to be used.

#### British to Sell Airships

London.—According to the New York Times correspondent, the Air Ministry has decided to dispose of a number of airships and air stations. Among those intended for disposal are the R-80, built by Vickers, and the R-39, constructed at the Armstrong, Whitworth plant. Both of these airships will be larger than the R-34. The R-36 and the R-37 are also said to be intended for sale.

#### 3,000 Passengers Carried by Handley Page Company

London.—Messrs. Handley Page have now taken up nearly 3,000 paying passengers on their week-end flights.

During the last month they have been running a regular service to Bournemouth, with a bombing machine converted into a comfortable passenger machine, leaving Cricklewood Aerodrome every Friday afternoon for Bournemouth, and leaving Bournemouth for London every Monday

Bournemouth, with a boinding machine control of the surprise of the most passenger machine, leaving Cricklewood Aerodrome every Friday afternoon for Bournemouth, and leaving Bournemouth for London every Monday.

Their exhibits at the Amsterdam Exhibition consist, for the most part, of two machines—one a big four-engine super Handley and the other an absolutely new two-engine passenger-carrying limousine aeroplane. The big four-engine machine was flown over to Brussels plane. The big four-engine machine was flown over to Brussels in the middle of July. This machine left Cricklewood shortly after 7 A.M., reaching Brussels about 10 A.M. It caused an extraordinary sensation in Brussels and thousands of people crowded on the aerodrome to see it in flight and landing. Many Belgian notabilities took a flight. After a day or two's stay in Brussels it flew to Amsterdam to be shown in the Exhibition. This again was a very successful flight and in spite of the unsuitability of the aero-drome Colonel Douglas managed to make a good landing. An immense crowd immediately gathered round the machine. The question of housing is now the difficulty of the moment, but eventually either the roof was raised or the ground dug out and a safe home was found for it. It will remain there on exhibition until the end of the show. The new two-engine machine did not have the luck of its super brother. After setting out from Cricklewood on Saturday, July 26th, it flew in record time to Calais, but from here onward its passage was extremely difficult. Over Breda it was caught in a severe hallstorm and, owing to other difficulties, had to make a forced landing. It eventually reached Amsterdam, after two days' delay, and owing to its weight and the bad condition of the surface of the aerodrome at Amsterdam it sunk almost nose-deep into the mud. It was unhurt, however, and is now ready, providing the aerodrome is improved, for passenger service.

An extremely interesting sight was to be seen at Cricklewood Aerodrome on Sunday, August 27th, when a

#### Airship Old Comrades Association Formed in London

Airship Old Comrades Association Formed in London

London, Eng.—An association has now been formed, in connection with and under the auspices of the Airship Officers' Club, to be known as the Airship Old Comrades' Association, whose address for the present is at 4 Dean Stanley Street, Westminster, where the Honorary Secretary will be pleased to receive any communications from those interested. The idea of the committee of the Airship Officers' Club in bringing this association into being, is to help All ranks, including officers and N. C. Os., both men and women. With this point in view, the primary objects of the association will be the formation of a mutual benefit society and head-quarters for obtaining, without charge, employment both relating to airship construction and flying, as well as any other form of employment, and to that end a register will be kept up to date. To join up, only a nominal annual subscription of 2s. 6d. is payable. A feature of the association will be the organizing by the committee of "Old Comrades" dinners, meetings and other entertainments, thereby helping to keep the past and present airship men in touch with each othr.

The primary object of the association will be to form a mutual benefit society and to provide headquarters for obtaining employment in any way connected with airship construction or flying. It will also endeavor to assist members of the association to obtain any other form of employment, but will in no way be responsible should it fail to do so. The association will make a donation to assist the association if he or she is able.



Motor searchlight manufactured by the Fiat Company for anti-aircraft and landing field service. The electric generator is mounted on the truck and the searchlight on the trailer



# ELEMENTARY AERONAUTICS

### and MODEL NOTES

By John F. McMahon



PACIFIC NORTHWEST MODEL AERO CLUB

921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB

8730 Ridge Boulevard, Bay Ridge, Brooklya
INDIANA UNIVERSITY AERO SCIENCE
CLUB

CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

#### CLUBS

DENVER MODEL AERO CLUB 2820 Raleigh St., Denver, Colo. BUFFALO AERO SCIENCE CLUB

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St.,
Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg.,
Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB 455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
AERO SCIENCE CLUB OF AMERICA
Beach Bidg. E. 23rd St.,
N. Y. City
AERO CLUB OF LANE TECHNICAL
HIGH SCHOOL

Sedgwick & Division Streets, Chicago, Ill.

THE model aeroplane shown below is of German origin and is reprinted from Flugsport. Flugsport is to German aeronautic followers what AERIAL AGE is to Ameri-

The model shown is interesting inasmuch as it is the first received in this country since the war. This particular one appeared in the July, 1919, issue of *Flugsport* and is known as the Siki Record Model. It is a biplane, and although not as large as the regular flying model it has performed exceptionally well.

The dimensions are given in millimeters, and as there are approximately 25 millimeters to an inch it is only necessary to divide any of the dimensions by 25 to get the required number of inches. For instance, 600 millimeters divided by 25 would give 24 inches.

The reader will note that the shape of the rudder and tail works follows our regular German practice, especially the balanced portions. The main planes are of novel shape, the entering edge being perfectly straight while the trailing edge is feathered and the ribs are of different lengths, making the chord greater at the center.

biplane tractor is a difficult model to fly, as it is tricky and hard to balance, but once the correct balancing point is found a prettier model and better flyer cannot be found. The model is very stable in flight if the agnles of incidence of each plane vary. For instance, a greater angle on the bottom wing than on the top wing will give the model great

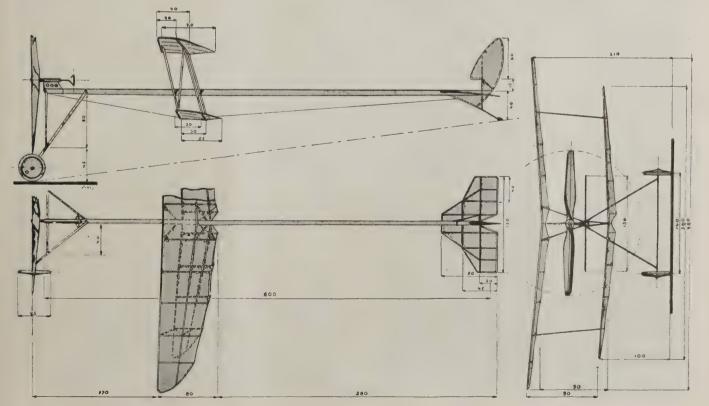
stability, as it not alone gives a stabilizing effect to the wing combination, but lightens the tail as well.

This model should be an inspiration to American aeromodelists. It shows how soon the Germans can go back into peace-time pastimes, and from the looks of things the young men of Germany are going after model records seriously and intend to make up for lost time. Our young men will not let them run away with things, I am sure; but it takes work and perseverance to get to the top of the model game and I advise readers to give more time to developing models along their own private ideas and copy as little of other models as possible. I do not mean to go off on some foolish shape or design of model, but be guided by what others are doing and add little improvements here and there to get a combination that will be a record breaker.

No model champion has ever become proficient by faithfully copying some other model; instead, he has thought out improvements that would add to the efficiency and flying qualities of some other successful model and gained thereby.

Some years ago Henry Criscouli, of the Long Island Model Club, built a model five feet long that could be folded up when not in use to occupy little space. This model was a wonderful flyer and would no doubt be a record breaker if developed. One of the members of the Pacific Coast Model Aero Club has built a model along these lines, but a trifle larger, which has made some very long flights. I expect to hear more of this model and would not be surprised if it breaks the existing record.

The secret of long-distance flight is, fairly large wings, very little resistance, light weight, and large propellers turning slowly. This combination is hard to get, no doubt, but it can be obtained if the model builder takes time and thinks of what he is doing or trying to do. I hope to hear of more model builders who are striving to develop a distinctive type of model that will make a record. Let the German model be one to beat! men of Germany are going after model records seriously





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Perils of Aviation

The flying men were boasting a little about the risks they had run and the falls they had survived and the meek civilians listened and gasped. One of the latter, however, was not quite so meek as he seemed.

You're not telling us anything so wonderful," he remarked. "Why, I know a chap who never was in the army even, and yet he dropped seventy feet into a vat of scalding water and wasn't a bit the worse, but went straight on with his job."

And they were incredulous.
"It's true," said the civilian. "They were pigs' feet, you know."—New York Globe.

#### **Guard Duty**

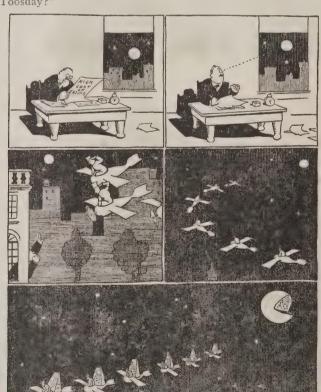
An awkward rookie was walking sentry. A martinet, expecting him to make some error, crossed his post. Sure enough, the rookie challenged, "Who goes there?" while at

"Bone-head!" snapped the martinet, ignoring the challenge.
"Pass, bone-head, and all's well," returned the rookie, resuming his march.—American Legion Weekly.

#### A Contribution from England

It appears that we are now to have jokes of the air craft,

from an English paper:
Small Boy (to pilot)—"If you be a-goin' up, zur, would ye see if ye can find Billy's kite driftin' about, wot 'e lorst larst Toosday?"



Mayor Hylan's Sky Cops solve high cost of living problem.-Frueh in the New York World

#### As Prescribed in the I. D. R.

Officer—"Why didn't you salute me?"
Colored Rookie—"'Cause Ah was told not t' salute officers
with a cigarette in ma mouth, suh."—Ontario Pest.

#### Always First

A pioneer newspaper editor had a reputation for always assuming infallibility and superior enterprise. On one occasion the paper announced the death of William R. Jones, who, it turned out, was not dead. Next day the paper printed the following note: "Yesterday we were the first newspaper to publish the death of William R. Jones. To-day we are the first to deny the report. The Morning Star is always in the lead."-The Continent.

# Rules for Passengers on the Trans-Atlantic Floater, the Blimpsitania

(From the N. Y. American.)

All passengers must be on board ten minutes before sailing The gangladder will not be lowered after that.

Passengers must not talk to the pilot. What's the use? He can't hear you above the noise of the motors, anyway.

Passengers must stay off the captain's bridge. Those who do not stay off will be blown off.

Women who appear on the hurricane deck in fluffy skirts do so at their own risk. (Men must not remain on the hurri-cane deck more than ten minutes at a time. Move on and give some one else a chance.)

Always remember when you hang up your hat to put your foot on it.

Never leave your baggage without strapping it to the floor of your cabin. When entering your cabin always open the door cautiously for fear the floor may have become the ceiling while you were out.

Never leave valuable papers lying about in your cabin. We haven't time to search the clouds for missing articles.

Always appear promptly for meals in the salon. We never know how long the food will stay on the table.

If you wish ice water ring the bell. If you wish salt water lower a bucket. If you wish hard liquor wait till we get three miles from shore.

There are no billiard tables on the Blimpsitania. Be reasonable.

All smoking must be done in the fireproof compartment arranged for that purpose. Be careful where you flick your This ship isn't equipped with fire escapes.

Leave all valuables with the purser. They'll be as safe there as anywhere.

A whistle will be blown ten minutes before we land. That's a signal for you to grab hold of some solid and-HOLD ON TIGHT!!!

# A United States Naval Officer Says:

"The engines on the C-5 are the most economical are the most economical built. They have recently undergone some wonderful tests in Washington, and it was found that this type motor is almost impossible to wear out."

— Not You! ?

The C-5 holds the world's record for non-rigid alrehips for a non-stop long distance flight.

UNION GAS ENGINE CO. DAKEAND, CALIFORNIA

#### 28

# AEROPLANE INSURANCE

# Merchants Fire Assurance Corporation of New York

This company issues policies covering aircraft against the following risks:

1—FIRE AND TRANSPORTATION

2—COLLISION (Damage sustained to the plane itself)

3—PROPERTY DAMAGE (Damage to the property of others)

Additional coverage may be had against loss by wind storm, cyclone or tornado.

We will be glad to discuss problems concerning aeronautic insurance.

# MERCHANTS FIRE ASSURANCE CORPORATION OF NEW YORK 45 JOHN STREET, NEW YORK CITY

AUSTEN B. CREHORE, Manager For two years pilot Lafayette Flying Corps. Since 1910 employed by this company.

FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

Honorary Companionship of the Distinguished Service Order (D.S.O.).

First Lieutenant Allan Francis Bonnalie, United States Signal Reserve, Aviation Section (France).

Major Russell Willett Bryant, United States Aviation Service, Washington (formerly U.S.A. Headquarters, London)

Captain Hutchinson Ingram United States Naval Aviation Service, Washington (formerly U.S.A. Headquarters, London).

Lieutenant Colonel John Armstrong Drexel, United States Signal Service, Washington (formerly attached to the Air Ministry, London).

Lieutenant Commander Walter Atlee Edwards, United States Navy and Aviation Service, London.

Major Andrew Jackson McElroy,

United States Aviation Service, Headquarters, London (formerly attached to Southwestern Area, Royal Air Force, Salisbury, Wiltshire).

Awarded the Distinguished Flying Cross for Gallantry in Flying Operations Against the Enemy.

United States Aviation Service.
Lieut. Hilbert Liegh Bair (France).

Lieut. Clayton L. Bissell (France).

Second Lieut. Howard Burdick (France)

First Lieut. Lawrence Kingsley Callahan (France) Merton Llewellyn Campbell

(France). Henry Robinson Clay, Jr. (France).

First Lieut. Jesse Orin Creech (France). Second Lieut. John Owen Donaldson (France).

Lieut, Artelus L. Gates (Flanders-Dunkirk).

Lieut. Llovd Andrews Hamilton (France)

Lieut. Charles Louis Heater (France). Lieut. Thomas John Herbert (France). Lieut. David Sinton Ingalls (Flanders-Dunkirk)

Lieut. James Alfred Keating (France). First Lieut. Field E. Kindley (France). Second Lieut. Howard C. Knotts

(France) Major Reed Gresham Landis (France). Lieut. Frederick Ernest Luff (France). Lieut. Elliot White Springs (France). First Lieut. William D. Tipton Tipton

(France). George Augustus Lieut. (France).

Awarded the Air Force Cross.
For distinguished service in Aviation not in action against the enemy.
UNITED STATES AVIATION SERVICE.
Ensign Philip J. Barnes. (Airship Cap-

tain, SSZ.)
Ensign Norman

Ensign Norman Jackson Learned. (Airship Captain, SSZ.)

Awarded the Air Force Cross.

For the successful flight across the At-

For the successful flight across the Atlantic, Trepassy Bay, Newfoundland, to England via the Azores:
Lieut. J. L. Breese, U. S. Navy.
Lieut. W. Hinton, U. S. Navy.
Lieut.-Comdr. A. C. Read, U. S. Navy.
Ensign H. C. Rodd, U. S. Navy.
Lieut. E. F. Stone, U. S. Navy.
Commander J. H. Towers, U. S. Navy.
Awarded the Air Force Medal.
Chief Mechanic-Mate E. S. Rhoads
(NC4).

(NC4).

Awarded the Silver Medal of the Society for the Protection of Life from Fire. For conspicuous gallantry not in action against the enemy.

UNITED STATES AVIATION SERVICE. Ensign John C. Foster (Dunkirk-

Flanders.) Sherwood Hubbell. (France-Lieut.

Lieut. Snerwood Hubben, (France-Independent Force.)
Lieut. Louis Ward Wheelock. (Aerodrome, Ayr, Scotland.)

Awarded the Meritorious Service Medal.
No. 19112 Sergt. M. E. Dudley, 11th

American Aero Squadron.

No. 19114 Sergt. H. E. Lewis, 11th American Aero Squadron.

For gallant conduct and devotion to duty on 23rd of March, 1918, at Stamford, Northamptonshire.

No. — Acting Corpl. Lewis Edward Meckel, 163rd American Aero Squadron. For gallant conduct and devotion to duty on 12th of June, 1918, at Narborough, Norfolk.

No. 31627 Master Signal Electrician ssex Marsh, 1099 American Aero Essex Marsh, 1099 American Aero Squadron, attached Independent Force, No. 3 Aircraft Depot.

For valuable services to the Independent Royal Air Force in France.

The undermentioned have been mentioned in dispatches and official reports in recognition of distinguished services rendered to the Royal Air Force:

United States Aviation Service.

UNITED STATES AVIATION SERVICE.
Ensign Francis Gerauld Allen. (London Gazette, 3rd June, 1918.)
Ensign Philip J. Barnes, A.F.C. (London Gazette, 1st January, 1919.)
Ensign John C. Foster. (London Gazette, 1st January, 1919.)
Lieut. Artelus L. Gates, D.F.C. (London Gazette, 1st January, 1919.)
Lieut. August L. Grimme. (London Gazette, 1st January, 1919.)
Lieut. Charles Louis Heater, D.F.C. (London Gazette, 1st January, 1919.)



Sherwood Hubbell. (London Gazette, 1st January, 1919.) Pilot-Ensign P. J. Ives.

(London Ga-

ette, 21st September, 1918.)
Lieut. David Sinton Ingalls, D.F.C.
(London Gazette, 1st January, 1919.)
Ensign Norman Jackson Learned,
A.F.C. (London Gazette, 1st January,
1919.)

1919.)

Pilot-Ensign John Francis McNamara. (London Gazette, 21st September, 1918.)
First Lieut. Sidney Richard Simmons.
(London Gazette, 3rd August, 1918.)
No. 31627 Master Signal Electrician

No. 31627 Master Signal Electrician Essex Marsh. (London Gazette, 1st January, 1919.)

UNITED STATES AVIATION SERVICE.

Mentioned for valuable services to the Royal Air Force, in the Air Ministry List announced in the Public Press, 22nd January, 1919:

Major Andrew Jackson McElroy, D.S.O., attached Southwestern Area, Royal Air Force, Salisbury. Lieut. Louis Ward Wheelock, attached

R.A. Force, Ayr, Scotland.
No. 19112 Sergt. M. E. Dudley, 11th
Squadron, United States Air Service,

Squadron, United States Air Service, Stamford, Northamptonshire. No. 19114 Sergt. H. E. Lewis, 11th Squadron, United States Air Service, Stamford, Northamptonshire.

Stamford, Northamptonshire.

No. — Acting Corpl. L. E. Meckel,
163rd Squadron, United States Air Service, Narborough, Norfolk.

No. 1068169 Private W. L. Ward, 219th
Squadron, United States Air Service,
Harling Road, Thetford, Norfolk.

#### "My Flying Husband" in Woman's Home Companion

The first installment of Mrs. Earle L. Ovington's new book, "My Flying Husband," appears in the September issue of the Woman's Home Companion. Mr. Earle L. Ovington has been a pioneer in

aeronautics and is president of the Curtiss Flying Station at Atlantic City.

#### \$1,000,000 California Air Line Company Organized

Los Angeles.-The incorporation of a new organization to promote and control aircraft transportation and known as the California, Great Western and Interstate Air Route, was announced by R. J. Daum at a meeting of fifty business men at the Athletic Club. The plan of the company, which is incorporated at \$1,000,000, is to develop commercial aviation throughout the West.

The company plans to promote, establish, maintain and operate chains of various types of aircraft and landing stations and will make every effort to stabilize the air industry. Fields have been selected and plans drawn for complete landing stations at Los Angeles, San Francisco, Oakland, Sacramento, Phoenix, Yuma and other points. All fields and landing stations are to be standardized.

Offices and hangars costing from \$2,000,000 to \$3,000,000 will be erected on each field, according to the plans. The home company is to sell the transportation and act as the central administration. Routes are to be charted and marked by lights and other devices.

# Paton MacGilvary, President of New England Curtiss Co., Participated in Daylight Raid On Pola

Paton MacGilvary, president of Curtiss Airplane Company of New England, which was recently incorporated to act as distributers of Curtiss flying boats and land machines in New England and also in the West Indies, enjoys the distinction of having piloted the plane that was leader of the first group of bombing machines to make a daylight raid on the Austrian naval base at Pola.

He enlisted in the air service in May,

1917, going to the first Officers' Training 1917, going to the first Officers' Training Camp at Fort Sheridan, Ill. He was later assigned to Rantoul and sailed for France in August, 1917. He took his preliminary training in Italy and was, for a time, chief pilot and commanding officer of Campo Ovest at Foggi, Italy. He was also engineer for the Joint Army and Navy Aircraft Board in Italy and in that capacity inspected most of the Italian aviation factories aviation factories.

He went to the front with the first twenty American aviators on the Italian front as adjutant of the combat division of the United States Air Service in Italy. He flew on the front for over five months, piloting S.I.A. and Caproni planes.

He was decorated by the King of Italy

in person and awarded the Croce di Guerra in addition to receiving several citations.

On the bombing raid on Pola, he piloted Major Vece who was at that time the first Italian military aviator, and Congressman-Major Negrotto, chief of the Italian bombing service on the front. He had many narrow escapes and was in several encounters.

The officers of the Curtiss New England company are: Paton MacGilvary, President and General Manager; F. H. Russell, Vice President; Directors, W. W. Mountain, Vice President, Curtiss Aero-Mountain, Vice Fresident, Curtiss Aeroplane and Motor Corporation; F. H. Russell, General Manager, Curtiss Engineering Corporation; Roger H. Williams, Vice President, Bank of Commerce; J. P. Davies, General Sales Agent, Curtiss Aeroplane & Motor Corporation; and Paton MacGilvary.

Robert P. Lay has been appointed special engineer in the engineering department of the H. H. Franklin Manufacturing Company, Syracuse, N. Y. He was formerly assistant chief engineer of the Curtiss Engineering Corporation, Garden City, N. Y.



# BELLANCA"

FOR REASONS, SPECIFICATIONS AND ALL INFORMATION :-MARYLAND PRESSED STEEL CO. (AIRCRAFT DEPT.) 299 MADISON AVENUE, NEW YORK CITY HARRY E. TUDOR, Sales Manager

(Continued from page 10)
paragraph, will be considered by the Government to be a waiver upon the part of the bidder to any claims to right of design and production.

All contracts must be upon a fixed price basis and will follow the form now in use by the Engineering Division, Air Service, which includes, inter alia:

(a) The right of the Government to terminate the contract at any time in accordance with the standard provisions

of Engineering Division contracts for aeroplanes.

Time is of the essence of every contract, and bidder must state the time limit of his proposition, which will be considered coincident with the price. In bidding upon time limit for construction, the bidder must take into consideration the thirty days and the forty-five days allowed to the Government to test the first and second aeroplanes respectively, for the purpose of determining any changes desired in aeroplanes.

(c) The Government will furnish without cost to the contractor, armament, engines, instruments and standard aeroplane accessories which cannot be purchased in the open market, but will not furnish or sell miscellaneous

materials entering into aeroplane construction.

(d) Partial payments will not be made to any contractor, except upon delivery, inspection and acceptance by the Engineering Division of a completed item, covered by the contract. Financial advances to contractors are now prohibited. Payments for the three aeroplanes contracted for will be made as follows: For the first, 40 per cent; for the second, 30 per cent, and for the third, 30

All contracts must be accompanied by an approved surety

All contracts must be accompanied by an approved surety bond in duplicate for the full amount of the contract. All items contracted for must be delivered in good condition by the Contractor, f.o.b. the Headquarters of the Engineering Division, Air Service, where each item must be tested by a representative of this Division, and according to the terms of the conditions. cepted or rejected according to the terms of the contract. Contracts will allow a contractor an agreed time within which to modify and rectify any rejected item, with a view to making the same acceptable to the Gov-

This circular proposal is intended to cover 1919-1920

program of experimental aeroplanes to be constructed for and under the direction of the Engineering Division, Air Service. Bidders should closely examine the general specifiocations here and the form of contract which will be required by the Government.

R. H. FLEET, by the Government.

Major, A.S.A., Contracting Officer, Engineering Division, Air Service.

Effect of Number of Coats on the Moisture Resistance of Spar Varnish

Recent experiments at the Forest Products Laboratory have provided some information concerning the relative protection against water afforded by various numbers of coats of spar varnish.

For these experiments three varnishes were selected from about forty brands tested, the first varnish being one of the best of the forty, the second a little better than the average, and the third a little below the average. From two to twelve coats of each varnish were applied to panels of yellow birch, which were then exposed 17 days to a humidity of 100 per cent. The results are given in the accompanying table.

Comparative Reduction in Absorption of Moisture and Swellin Caused by Different Numbers of Coats of Spar Varnish Exposed for a Period of 17 Days in a Saturated Atmosphere Swelling

No. of Coats of Spar	Percentage of Moisture excluded (based on untreated specimens)  Percentage of Increase in width due to absorption of Moisture					orption
Varnish	1st Varnish	2nd Varnish	3rd Varnish	1st Varnish	2nd Varnish	3rd Varnish
0 2 4 6 8 10 12	0.0 76.7 86.2 88.6 91.0 93.0 94.3	0.0 72.0 75.8 81.7 86.9 88.4 89.0	0.0 65.5 76.9 83.0 86.2 87.3	8.61 2.01 1.19 0.98 0.77 0.60 0.49	8.61 2.41 2.08 1.57 1.30 1.00 0.90	8.61 2.97 1.99 1.46 1.19 1.09 1.10

It will be noted that two coats of the first varnish were about as effective as four coats of either of the other two, and that four coats of the first varnish were about as effective as six to twelve coats of either of the others. The first varnish gave increasing moisture resistance with each additional coat, but practically nothing was gained by adding more than six coats of the others.



ol. 10, No. 2

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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879
Copyright THE AERIAL AGE CO., September 22, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, SEPTEMBER 22, 1919

NO. 2

### LAWSON AIR LINER MAKES HISTORY

INTERRUPTING their game of bridge from time to time to observe the cloudscapes, visible through the windows of their cabin fuselage, four passengers reached Mitchel Field, Mineola, September 13, aboard a Lawson Air Liner in a flight which occupied two hours and forty-seven minutes. It left Syracuse at 8 o'clock in the morning. The distance travelled was estimated at 313 miles.

The bridge players sat in wicker chairs, were protected from the rush of wind created by their transit through space at 111 miles an hour by celluloid windows smoked to guard against the sun glare in the upper levels, and occasionally rose and walked up and down the aisle to stretch their legs. Forward in the pilots' seats sat Alfred W. Lawson, the genius of the Lawson Air Line, and Charles Cox, assistant pilot. They had dual controls for governing the craft, so that when either got tired the other could run the ship alone.

Those taking part in the card game were Mr. and Mrs. Walter Carrier of Syracuse, Miss Anna B. Cowse and John Cullum, the latter pair representing Syracuse newspapers. Looking on when their attention was not required elsewhere were Vincent Buranelli, the engineer, and Carl Schorny and Alfred S. Suini, mechanics. Altogether the craft carried nine.

It was a wonderful day and a wonderful ride. Everybody aboard agreed to that. If it hadn't been for the smoking of the celluloid the September sunshine might have been a bit bothersome, but with that precaution conditions were perfect.

They were pretty well up in the air when from the pilot came

the word that New York was in sight and passengers should prepare to land. Roosevelt Field had been chosen in advance, and the big plane headed for there, but Mr. Lawson changed his mind when he saw Mitchel Field. He noted that it was clear and smooth and eased the ship down.

It was considerably more than a flight from Syracuse the plane finished at Mineola, for it has been on the go pretty steadily for the past month, ever since it left Milwaukee for Chicago. It flew from the Windy City to Cleveland, then to Toledo, to Buffalo and Syracuse. At Toledo it was delayed a bit by grazing the branches of a tree. At Syracuse it made a bad landing at Bethko Field and was laid up ten days for repairs.

The Lawson is the first multi-motored passenger-carrying plane with inclosed cabin to attempt a cross-country flight in the United States.

Its flight from Milwaukee to New York is a distinct achievement, and Mr. Lawson is to be heartily congratulated.

achievement, and Mr. Lawson is to be heartily congratulated. On September 15 a group of aeronautic authorities and newspaper men, made a trip from Mineola to New York, in the Lawson air liner. The passengers making the flight were: Augustus Post, Henry Woodhouse, Capt. Robert Bartlett, Richard H. Watkins, New York Sun; J. Earl Clauson, New York World; S. H. Pierson, Morning Telegraph; Jack Binns, New York Tribune; Eugene Fowler, New York American; N. H. Johnson, Brooklyn Eagle; John A. Bockhorst, George J. Smith, and J. G. Fraenkel, photographers.

# TO APPLY THE INTERNATIONAL RULES OF THE AIR IN THE UNITED STATES

THE Aerial League of American has submitted to the consideration of leading aeronautic and judicial authorities the international rules of the air drafted by the Aeronautic Commission of the Peace Conference, for the purpose of obtaining their opinion regarding the possible application of these rules to govern aeronautics in the United States pending the drafting of Federal laws to govern aerial navigation.

The international rules of the air include the rules of the air drafted by the representatives the National Aero Clubs which represent the 38 countries in the International Aeronautic Federation and the Pan-American Aeronautic Federation, of which the Aero Club of America is the sole representative in the United States. This last organization adopted the regulations of the International Aeronautic Federation and accepted its jurisdiction in 1916, therefore there is no variance of opinion or regulations between the two federations. They co-operate closely.

The Aeronautic Commision of the Peace Conference was wise in adopting the regulations of the International Aeronautic Federation, which are familiar to the Aero Clubs of the 38 countries and to the 40,000 pilots holding the Federation's certificate issued by the national club representing the Federation in each country.

The International Rules of the Air, which are reproduced herewith in part, and are being published in full in the "Textbook of Aerial Laws and Regulations of Air Traffic," and can be secured through the Aeronautic Library, 299 Madison Avenue, New York City, are as follows:

# RULES AS TO LIGHT AND SIGNALS Definitions

The word "aircraft" comprises all balloons (whether fixed or free), kites, airships, and flying machines.

or free), kites, airships, and flying machines.

The word "balloons," either fixed or free, shall mean an aircraft using gas lighter than air as a means of support, and having no means of propulsion.

having no means of propulsion.

The word "airship" shall mean an aircraft using a gas lighter than air as a means of support, and having means of propulsion.

The words "flying machine" shall mean all aeroplanes, seaplanes, flying boats, or other aircraft heavier than air, and having means of propulsion.

An airship is deemed to be "under way" within the meaning of these rules, when it is not made fast to the ground or any object on land or water.

#### I Rules as to Lights

The word "visible" in these rules when applied to lights shall mean visible on a dark night, with a clear atmosphere. The angular limits laid down in these rules as shown in the sketch shall be determined when the aircraft is in its normal attitude for flying on a rectilinear horizontal course.

1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other which may be mistaken for the prescribed lights shall

be exhibited. The prescribed navigation lights must not be

dazzling.
2. A flying machine, when in the air or manoeuvering on land or water under its own power, shall carry the following

lights:

(a) Forward, a white light visible in a dihedral angle of 200 degrees bisected by a vertical plane through the line of flight, and of such a character as to be visible at a distance of at least 8 kilometers.

(b) On the right side a green light so constructed and fixed as to show an unbroken light between two vertical planes whose dihedral angle is 110 degrees when measured to the right from dead ahead, and of such a character as to be visible at a distance of at least 5 kilometers.

(c) On the left, a red light so constructed and fixed as to show an unbroken light between two vertical planes whose

dihedral angle is 110 degrees when measured to the left from dead ahead, and of such a character as to be visible at a distance of at least 5 kilometers.

(d) The said green and red side lights shall be fitted so that the green light shall not be seen from the left side, nor the red light from the right side.

(e) At the rear, and as far aft as possible, a white light shining rearward and visible in a dihedral of 140 degrees bisected by a vertical plane through the line of flight and of such a character as to be visible at a distance of at least 5 kilometers.

(f) In the case where, in order to fulfill the above conditions, the single light has to be replaced by several lights, the field of visibility of each of these lights should be so limited

that only one can be seen at a time.

3. The rules determined for the lighting of flying machines shall apply to airships subject to the following modifications:

(a) All lights shall be doubled; the forward and aft lights vertically, and the side lights horizontally in a fore and aft direction.

direction.

(b) Both lights of each pair forward and aft shall be visible at the same time. The distance between the lights comprising a pair, shall not be less than 2 meters.

4. An airship, when being towed, shall carry the lights specified in paragraph 3, and in addition, those specified in

paragraph 5, and in addition, those specified in paragraph 6 for airships not under control.

5. (a) A flying machine or airship, when on the surface of the water, and when not under control, that is to say, not able to manoeuver as required by the Regulations for the Prevention of Collisions at Sea, shall carry two red lights not less than two meters apart one over the other, and of such a character as to be visible all around the horizon at a distance of at least three kilometers.

(b) The aircraft referred to in this paragraph, when not making way through the water, shall not carry the side

lights, but when making way shall carry them.

6. An airship which from any cause is not under control, or which has voluntarily stopped her engines shall, in addition to the other specified lights, display conspicuously two red lights, one over the other, not less than 2 meters apart, and constructed to show a light in all directions, and of such a character as to be visible at a distance of at least three kilometers.

By day an airship, when being towed, which from any cause

By day an airship, when being towed, which from any cause is not under control, shall display conspicuously two black balls of shapes, each 60 cms. in diameter, placed one over the other not less than 2 meters apart.

An airship moored, or under way, but having voluntarily stopped its engines, shall display conspicuously by day a black ball or shape, 60 cms. in diameter, and shall be treated by other aircraft as being not under control.

7. A free balloon shall carry one bright light below the car at a distance of not less than 5 meters, and so constructed as to show an unbroken light in all directions, and of such

as to show an unbroken light in all directions, and of such character as to be visible at a distance of at least three

8. A fixed balloon shall carry in the same position as the white light mentioned in paragraph 7, and in lieu of that light, three lights in a vertical line one over the other, not less than 2 meters apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible in all directions at a distance of at least three kilometers.

In addition, the mooring cable shall have attached to it at intervals of 300 meters, measured from the basket, groups of three lights similar to those mentioned in the preceding paragraph. In addition, the object to which the balloon is moored on the ground shall have a similar group of lights to mark

its position.

By day the mooring cable shall carry in the same position as the groups of lights mentioned in the preceding paragraph, and in lieu thereof, tubular streamers not less than 20 cm. in diameter and 2 meters long, and marked with alternate

bands of white and red, 50 cm. in width.

9. An airship when moored near the ground shall carry the lights specified in paragraphs 2 (a) and (e) and 3.

In addition, if moored not near the ground, the airship, the mooring cable, and the object to which moored, shall be marked in accordance with the provisions of paragraph 8, whether by day or by night.

Sea anchors or drogues used by airships for mooring pur-

poses at sea are exempt from this regulation.

10. A flying machine stationary upon land or water, but not anchored or moored, shall carry lights specified in para-

graph 2.

11. In order to prevent collisions with surface craft:—

(a) A flying machine when at anchor or moored on the water shall carry forward, where it can best be seen, a white light, so constructed as to show an unbroken light visible all around the horizon at a distance of at least two kilometers.

(b) A flying machine of 50 meters or upward in length, when at anchor or moored on the water, shall in the forward part of the flying machine carry one such light, and at or near the stern of the flying machine, and at a height that it shall not be less than 5 meters lower than the forward light, another such light.

The length of a flying machine shall be deemed to be the

overall length.

(c) Flying machines of 50 meters or upward in span, when at anchor or moored in the water, shall in addition carry at each lower wing tip one light as specified in (a) of this paragraph.

The span of a flying machine shall be deemed to be the

maximum lateral dimension.

12. In the event of failure of any of the lights specified under these rules to be carried by aircraft flying at night, such aircraft shall land at the first reasonably safe opportunity.

13. Nothing in these rules shall interfere with the operation of any special rules made by the Government of any State with respect to the additional stations or signal lights for two or more military aircraft, or for aircraft in formation, or with the exhibition of recognition signals adopted by owners of aircraft which have been authorized by their respective Governments and duly registered and published.

#### П

#### Rules as to Signals

14. (a) Aircraft wishing to land at night on aerodromes having a ground control shall before landing:

Fire a green Very's light or flash a green lamp, and in addition shall make by international Morse code the letter group forming its call sign.

(b) Permission to land will be given by the repetition of

A green Very's light or flashing a green lamp.

15. The firing of a red Very's light or the display of a red flare from the ground shall be taken as an instruction that aircraft are not to land.

land,
16. An aircraft compelled to land at night shall before landing fire
red Very's light or make a series of short flashes with the navigation

a red Very's light or make a solution in the series and requires assistance, the following shall be the signals to be used or displayed, either together or separately:

The international signal, SOS, by means of visual or wireless

lowing shall be the signals to be used of displayed, either together of separately:

(a) The international signal, SOS, by means of visual or wireless signals.

(b) The international code flag signal of distress, indicated by NC.

(c) The distant signal, consisting of a square flag having either above or below it a ball, or anything resembling a ball.

(d) A continuous sounding with any sound apparatus.

(e) A signal, consisting of a succession of white Very's lights fired at short intervals.

18. To warn an aircraft that it is in the vicinity of a prohibited zone and should change its course, the following signals shall be used:

(a) By day: three discharges, at intervals of ten seconds, of a projectile showing on bursting white smoke, the location of the burst indicating the direction the aircraft should follow.

(b) By night: three discharges, at intervals of ten seconds, of a projectile showing on bursting white stars, the location of the burst indicating the direction the aircraft should follow.

19. To require an aircraft to land, the following signals shall be used:

(a) By day: three discharges, at intervals of ten seconds, of a projectile showing on bursting black or yellow smoke.

(b) By night: three discharges, at intervals of ten seconds, of a projectile showing on bursting red stars or lights.

In addition, when necessary to prevent the landing of aircraft other than the one ordered, a searchlight which shall be flashed intermittently shall be directed toward the aircraft whose landing is required.

20. (a) In the event of fog or mist rendering aerodromes invisible, their presence may be indicated by a balloon acting as an aerial buoy or other approved means.

(b) In fog, mist, falling snow or heavy rainstorm, whether by day on night, an aircraft on the water shall make the following sound signals with a sound apparatus:

1. If not anchored or moored, a sound at intervals of not more than two minutes, consisting of two blasts of about five seconds' duration with an interval of about one second betw



# THE NEWS OF THE WEEK



#### Rohlfs Soars to 34,200 Feet

Roland Rohlfs soared to a new world's Roland Roll's soared to a new world's altitude record in his Curtiss "Wasp" at Roosevelt Field, Mineola, September 13. Rohlfs flew to a height of 34,200 feet, but because there were no officials present to seal his instruments the record is not official. The aviator is confident, however, he can repeat or better his performance under official auspices and promises soon to make a try at it.

promises soon to make a try at it.

The standing official altitude record is 33,136 feet, credited to Adjutant Casale of the French Army. In July, Rohlfs made an official flight of 30,700 feet. He was prevented from flying higher on that occasion by the chilling of his motor. Since then shutters have been fitted on the "Wasp's" radiator.

Rohlfs's observations during the flight of September 13 disclosed a "temperature lid" at 34,000 feet. At that altitude his thermometer registered a minimum of 44

thermometer registered a minimum of 44 degrees below zero. Then it began to grow warmer, showing 40 degrees below at 34,200 feet.

#### New York Has Aerial Taxis

The first metropolitan aerial taxis trip was made September 14. Lieutenant Robert Hewitt, formerly an ace in the army, piloted the seaplane. He had as passengers Gilda Gray, dancer in "The Gaities of 1919," a reporter and a dog mascot of the New York Sight-Seeing Aero Taxi Company Aero Taxi Company.

From Eighty-third Street and the Hud-

son River the plane flew to Ninetieth Street, where it took on passengers. The plane then circled the Statue of Liberty at 1,500 feet altitude, dipped into the bay, sped back to Spuyten Duyvil and thence to the landing. A dollar a minute, not including war tax, is the fare.

#### Hunters Plan to Use Aeroplanes

If enthusiastic sportsmen now assembling for the hunting season at Lake Placid and other points in the Adiron-dacks are correct the time is not far distant when the aeroplane will have a permanent place as an aid to successful hunting in these mountains. It is probable during the present season in the vicinity of Lake Placid one of the 'planes that has during the last few weeks been conveying passengers on sightseeing trips about the region will be put to test to determine its use in locating feeding grounds and haunts of deer.

#### Itinerary of NC-4's Trip to New Orleans Arranged

The itinerary of the NC-4 aerial recruiting expedition from Atlantic City to New Orleans was announced by the Navy Department. The transatlantic seaplane commanded by Lieutenant Commander A. The transatlantic seaplane, C. Read, who piloted the NC-4 across the Atlantic, accompanied by the United States ship Isabel, will leave Atlantic City

September 23.
The itinerary is as follows: Rockaway, September 25; Portland, Me., September

27; Boston, October 1; Providence, October 3; New Haven, October 6; Philadelphia, October 11; Baltimore, October 15; Washington, October 19; Norfolk, October 23; Charleston, October 27; Jackson-ville, October 30; Miami, November 3; Pensacola, November 4, and New Orleans, November 8.

# Securing American Aeroplanes for Far East

Lieut. E. C. Ricou, pilot in the French Army Air Service, was a visitor at the Aero Club of America September 14. He has just come to New York from Macao, China, to organize a commercial flying service for several large cities in China, India and Siam.

Lieut. Ricou has had a broad experience in the East, having been Chief of the French air forces operating in China. In addition to being an aviator, he is a capitalist and an engineer and has been prominent in starting large electric and

water companies.

He announces that he is financing the flying enterprise himself. The plans will unite Shanghai, Hong Kong, Hailfung, Canton, Tonkin and Macao by a commercial route, over which passengers and light foright will be carried.

light freight will be carried.

During the war Lieut. Ricou saw extensive service in the French campaign in Salonica and three times was shot down and wounded. After he had been or-dered to China he was responsible for the crushing of a local rebellion, actuated by German influence.



The aeronautic authorities included in the bodyguard of General Pershing on his arrival and at the City Hall reception, the parade and the welcome home dinner included Rodman Wanamaker, Allan A. Ryan, Alan R. Hawley, Charles Jerome Edwards, Henry Woodhouse, W. W. Miller, Col. Charles Elliot Warren, officials of the Aero Club of America; Henry P. Davison, Murray Hulbert, Colonel Jefferson DeMont Thompson, Capt. Charles J. Glidden, Major Howard L. Goodhart, Sydney B. Veit, Bernard H. Sandler, G. Douglas Wardrop and Major Herbert S. Mapes This photograph shows General Pershing, Governor Smith. of New York, Mayor Hylan, of New York, Mr. Wanamaker and the above mentioned aeronautic authorities and other prominent personalities

#### Warships to Have Seaplanes

Every American warship of the first and second class is to be equipped with a seaplane, it was learned at the Navy Department, September 13. This is to even up with the progress already made by Great Britain.

This policy, with the co-relative one of building a great fleet of dirigibles, is directly in line with the views of the naval war experts as to defense "in the next

war.''

They say the time has passed when a direct attack on sea coast cities like New York or Boston may be made by a battleship fleet, however powerful. The attack will be by seaplane, launched from a moving base of dreadnoughts at sea, navy officers assert. Hence the plan, now announced, to converting land planes into working seaplanes to be assigned to each of the larger ships.

#### Membership of Grand Rapids Aero Club Increasing

Grand Rapids, Mich.—Assurance that the newly organized Grand Rapids Flying Club is soon to become a real factor in Grand Rapids is evident from the class of business men and ex-service men listed for membership following the banquet given by the Association of Commerce and the Flying Club at the Kent Country

Club recently.

John Thomas Batts, the original and life-long booster of aviation in Grand Rapids, heads the list of those subscribing for life membership. Fred Z. Pantlind and T. Hersel Brown, two aviation enthusiasts, have signed up for subscribing membership. John A. Jordon, superintendent of the Western Division of the Air Mail Service and H. Jay Hayes of the Hayes-Ionia Company are the first to take out non-resident memberships. Associate memberships have been granted to E. A. Clements, Dr. Louis Barth and Arthur Rosenthal. The ex-service membership includes 12 army aviators, six naval aviators, one Marine Corps pilot and one captain from the Royal Flying Corps. Four ex-service men from Detroit and Traverse City also have signed up.

#### Aerial Trapshooting at Atlantic City

Atlantic City.—The first aerial trapshooting contests and exhibitions ever held in the history of aeronautics or in the history of shooting tournaments took place at the Atlantic City Airport on September 9, under the auspices of the International Trapshooting Committee of the Aerial League of America.

Earle L. Ovington, pioneer aeronaut and president of the Curtiss Flying Station in Atlantic City, piloted the aeroplane from which the shooting was done by expert marksmen from all parts of the country, who were in Atlantic City to attend the annual trapshooting tournament of the Westy Hogan Association.

The exhibition of aerial marksmanship consisted of shooting at clay pigeons and small balloons which were released from another aeroplane in full flight, and opened the Westy Hogan tournament, which lasted from September 9 to September 12 inchains a september 9 to Se

tember 13, inclusive.

The keenest interest in regard to the aerial contests was expressed by the crack shots of the Westy Hogans and the representatives of 4,600 gun clubs in the United States who were greatly enthused over this new form of sport and confidently predicted that it would become one of the most interesting and important features

of future national and international trapshooting tournaments.

#### More Texas Oil Men Buy Planes

Dallas, Texas.—S. E. J. Cox, of this city, is the latest oil promoter to purchase aeroplanes for travelling to his various oil wells and refineries, and for advertising purposes. He recently made a trip of 1,400 miles, from Dallas to Big Springs, Texas, and from there to Wichita, Kan., and return. For advertising purposes Cox purchased a Curtiss JN biplane, and for his own use he selected a Curtiss Oriole.

#### Aerial Police Protection for Boston in Case of Strike

Boston, Mass.—When the Boston police force threatened to strike recently, Paton MacGilvary, general manager of the Curtiss Aeroplane Company of New England, extended the services of his pilots and aeroplanes to the city authorities for aerial police protection. He received letters of thanks from Major Peters and Police Commissioner Curtiss, and it is entirely probable that Boston will soon establish an aerial police department.

#### Navy Free Balloon Over New York

New York, N. Y.—The first flight of a Navy free balloon over New York was successfully accomplished on September 10 by aviators from the Rockaway Naval Air Station. The balloon, which left Rockaway and was forced to land after a six-hour flight on account of rain at Arcola, N. J., made the trip for the purpose of scattering enlistment circulars to obtain recruits for the navy. The balloon





Cup presented to Earle L. Ovington by the Ocean City Yacht Club in appreciation of his sportsmanship

is the largest type of free balloon used in the navy and has 35,000 cubic feet of gas.

the navy and has 35,000 cubic feet of gas. The members of the crew who took the flight were Ensign L. Kloor, commanding pilot Lieut. Commander J. C. Monfort, Ensign C. M. Johnson, and Ensign J. E. Dyer. The balloon kept a constant altitude of 1,500 feet over the city and flew directly over the U. S. S. Recruit in Union Square. This type of balloon was used during the war to train lighter-than-air pilots and teach them how to handle a dirigible when unaided by the motors.

#### Curtiss Planes Speed Business During Railway Strike

Los Angeles, Cal.—Owing to the railway strike on the Pacific Coast, Mr. Garret S. Veeder, of New York and Schenectady, found himself marooned at Albuquerque, N. M., while en route to an important conference at Los Angeles recently with the executives of the Catherine Curtiss Corporation, One of Sydney Chaplain's Curtiss Orioles was dispatched to him, but on arriving at Albuquerque it was learned that he had just boarded the California Limited, which had resumed service. Instead, however, of returning to Los Angeles, Mr. Veeder was picked up at Needles, and thus completed the major part of the journey by air.

#### Lieut. Finley to Pilot White Monoplane on Trans-Pacific Flight

Los Angeles, Cal.—Lieut. William Finlay, former bombing pilot in the American Air Service, has been selected to pilot the trans-Pacific White monoplane when it starts on its long trip. Lieut. Finlay has flown American and foreign bombing planes of large size extensively and is thoroughly competent to handle the 82-foot monoplane.

He served as bombing instructor at Ellington Field for nearly two years, and has flown approximately 400 hours on Curtiss, De Haviland and Handley Pages. He has the remarkable record of having never crashed with any machine.

George D. White, designer of the monoplane and himself a pilot, will probably serve as relief pilot over the long stretches. Both pilots are experienced motor mechanics, and Lieut. Finlay is especially experienced on Hispano-Suiza motors, preferring these to all others.

This will be Mr. White's first long flight for more than eighteen months, as in April, 1918, he had both legs and three ribs broken as well as his shoulder dislocated when his racing car turned turtle. He has only recently been able to fly again, but now finds himself as strong as ever.

#### Liberty-Engined Motor Boat Wins Gold Cup Regatta

Detroit, Mich.—Two Packard-built Liberty aircraft engines propelled the winner and the runner-up in the Gold cup regatta for power boats on the Detroit River Labor Day. The Gold cup is the American classic for motor speed boats, regardless of class.

The victor, Gar Wood's Detroit III, racing under the colors of the Detroit Yacht Club, successfully challenged the three-year supremacy of the same owner's Detroit II, and roared past the finish buoy at 56 miles per hour.



#### Thompson Aeroplane Co. Curtiss Distributors in Michigan

Detroit, Mich.—Mr. William Blair, manager of the local Curtiss agency, which handles all business in Michigan and part of Ohio, is making a trip from Chicago to Detroit in a Curtiss Sea Gull, following the coast of the lower peninsula of Michigan and making stops at all principal cities along the route. Mr. Blair will visit several customers and prospects on his trip.

Mr. Blair was formerly a lieutenant in the Naval Air Service and was attached for a time to the northern bombing group, which conducted a very successful campaign against German submarines.

#### Cooper Aeroplane Company Organizes in California

San Francisco, Cal.—The Earl P. Cooper Company has been organized in San Francisco, and the new company will act as distributors for Curtiss aeroplanes in the northern half of California and the state of Nevada. A flying school and a number of aerial transportation lines will be operated by the company, for which Orioles and Seagulls will be used.

Earl Cooper is a well-known automobile race driver, having piloted Stutz cars to victory in many automobile classics of recent years. He will devote his entire energies to commercial aviation.

#### Humboldt Aero Club Buys Curtiss Plane

Eureka, Cal.—The Humboldt Aero Club of this city has just received from the Government a Curtiss biplane which was purchased at Mather Field, Dayton. Murray and Cecil Connick piloted the plane under its own power from Allesandro. The aviators encountered very difficult flying conditions on the route selected, known as the "coast route." The country is rugged, heavily timbered and mountainous, with few landing places.

lected, known as the "coast route." The country is rugged, heavily timbered and mountainous, with few landing places.

The Humboldt Aero Club in this flight initiated a series of pathfinding flights with a view to establishing routes for mail and passengers between San Francisco and Seattle on the south and Portland and Seattle on the north.

# The National Gauge and Equipment Company

Over seventy-five styles of pressure gauges and similar instruments are illustrated and described in a catalogue recently issued by the National Gauge & Equipment Company of La Crosse, Wis. This company specializes in small-sized instruments of special design for standard equipment. The catalogue is conveniently arranged by sections showing equipment for automobiles, aeroplanes, tractors, motor boats, and also instruments for welding outfits, house-heating boilers, air compressors and numerous industrial requirements.

# Splitdorf Establishes Repair Service for Aviators

New York, N. Y.—The Splitdorf Manufacturing Company, makers of the "Dixie" magneto, established the first re-

pair service for the especial use of aviators on the New York-Toronto race. C. S. Jones, a Curtiss pilot, with a Splitdorf service expert, preceded the race enrants in a Curtiss JN with a stock of magnetos and repair parts. Service stations were established at each of the control stations of the race, namely, at Albany, Utica and Syracuse, so that pilots could secure immediate assistance in case of ignition difficulties.

This is the first instance on record that aerial transportation was employed to establish a chain of service stations.

#### Sacramento Aviation Company Gives Night Flying Exhibition

Sacramento, Cal.—The Sacramento Aviation Company is conducting a passenger carrying and exhibition, stuntflying and instruction business with headquarters at Sacramento. Mr. L. J. Reese, manager of the company, was attached to the 96th Squadron of the 1st Day Bombardment Group. Mr. H. G. Andrews, atlhough commissioned in 1917, was stationed at Rich Field for most of the war period. He had over 1,000 hours in the air. Mr. Ancil Hoffman, treasurer, is a prominent local business man. The company's planes made night flights during the Cailfornia State Fair.

#### Personal Pars

The National Liberty of American has appointed President Charles H. Payne of the Aero Protective Association manager of its newly organized aviation department and proposes to cover aviation, fire, theft and collision hazards on an extended basis. It is understood the Aero Protective Association will act as general agents for the aviation department of the National Liberty throughout the United States and Canada.

States and Canada.
C. H. Walker has been appointed branch manager of the Pacific ocast branch of the Wire Wheel Corporation of America, with offices at San Francisco. Walker has been for several years district manager of the branch at Detroit of the Splitdorf Electrical Company.

Charles P. Grimes has been appointed development engineer of the Root & Van Dervoort Engineering Co. and will have charge of the dynamometer testing laboratory to be installed. Previously he has been with the Wheeler-Schebler Carburetor Co., Indianapolis, and with the National Motor Car Co. and Vehicle Corporation, Indianapolis, and during the war worked at McCook Field, Dayton, Ohio, supervising the installation of electrical dynamometer and other testing equipment for the Liberty engine.

#### Splitdorf Magnetos Make Good in Toronto Race

It is significant that the actual and nominal winners of the recent Toronto-New York aeroplane race piloted planes fitted with magnetos and six out of seven of the prize winners depended solely upon the magneto for their excellent performance. Major Schroeder, whose plane was equipped with an aero magneto, received a rating of 107.8 per cent and was the actual winner of the contest, though army rules did not permit of his accepting a money prize. However, H. R. Depew, in a Curtiss JN-4, also aero magneto equipped, was the nominal winner which carried a prize of \$2,500.

C. S. Jones, who won the second prize, \$1,500, was flying a JN-4, originally a Splitdorf plane and giving useful assistance to those pilots who needed it. This plain was a sort of general service plane and was used for flying from place to place during the contest, helping the other fliers get ready for the start. Since the rules allowed it and there was sufficient time, Jones decided to enter also, because his work of assistance had been finished.

Like its performance overseas during the war the Splitdorf magneto showed its inness and reliability by giving perfect ignition service on five planes which had a percentage of over 80. These were: Schroeder, VE-7, 107.8 per cent; Depew, JN-4, 106 per cent; Chandler, JN-4, 90.8 per cent; Taylor, JN-4, 96.8 per cent; Jones, JN-4, 82.3 per cent. Eight other planes which competed were equipped with Splitdorf aero magnetos.



The Splitdorf Service Plane, which won the second prize of \$1,500 in the New York-Toronto race



Pershing Receives Mail at Sea By

Aeroplane
New York, N. Y.—General John J.
Pershing received his important letters and the morning news on his arrival from overseas several hours before reaching port. An Aeromarine flying boat circled above the Leviathan at 4 A.M. on September 8 when she was still some distance out at sea and dropped a mail pouch aboard the deck.

# Folkstone-Cologne Mail Service Now Non-Stop

During the week ending August 16 the R.A.F. aerial mail service from Lympne

to Cologne carried no less than 7,090 pounds of letters and postal packets.

The service is carried on by two squadrons, Nos. 18 and 120. The former is using D.H.9A. machines with Liberty

engines and is working from the Cologne terminal, while the latter is equipped with the D.H.9 type with B.H.P. engines and works from Lympne.

The average time taken by machines of No. 18 on the journey is 3 hours 14 minutes, while No. 120, with rather less powerful engines, average 3 hours 23 minutes.

The intermediate stage at Maisconcelle now cut out and the machines fly through without a stop. Out of 45 trips commenced only in one case was there failure to complete the journey. The average weight carried per journey was 161 pounds.

#### Hydroaeroplane Mail Service for Argentina Contemplated

Washington, D. C.—It is announced here that advices have been received by

the Department of State from the Third Secretary of the American Embassy in Buenos Ayres that the Argentine Government is interested in the acquisition of hydroaeroplanes for possible mail service. The few hydroaeroplanes so far demonstrates the service of the service o strated in Argentina have been considered unsatisfactory, but several missions have recently arrived from Europe to show the latest types developed for civilian use.

#### Personal Par

E. G. Parsons has been appointed chief of engineering for the Dayton Wire Wheel Company, Dayton, Q. Parsons has been an engineer at the aeroplane ex-Parsons perimental station at McCook Field, Dayton. He formerly was associated with Thomas & Thomas, consulting automotive engineers of Detroit.

#### UNITED STATES POST OFFICE

AIR MAIL SERVICE—EASTERN DIVISION Monthly Report of Operation and Maintenance JULY, 1919

					uel,			-						SERVI	CE AN	D UNIT	COST	
Acroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallens of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
4 7 11 12 14 15 17 33 38A 39 42 43 65 71 77 79 80 81 82 83 84 85 86 87 87 88 89 90 91 91 91 92 14872 39364 44300 44301 44305	\$18.02 27.88 146.19 28.65 90.32 53.45 167.51 161.04 188.06 90.04 48.42 280.60 90.04 418.09 227.13 112.74 133.17 69.71 33.17 69.71 33.17 69.71 33.17 69.71 35.86 39.65 39	\$1.40 18.30 78.56 9.01 52.58 21.49 24.34 35.18 228.55 15.24 14.20 66.18 32.08 67.42 8.33.55 18.2	\$52.35 52.36 52.36 52.36 52.36 52.36 52.36 52.36	\$33.32 33.32 33.32 33.32 33.32 33.32 33.33	\$15.13 15.13 15.13 15.13 15.13 15.13 15.13 15.14	\$52.50 52.50 52.50 78.53 78.63 78.63 78.53 78.53 78.53 70.28 78.63 36.075 22.15 53.76 22.15 53.26 45.01 22.14 22.14 22.14 22.14 22.14 22.14 22.14 22.14 22.14 23.26 24.01 25.26 26.25 26.25 27.86 26.25 27.86 28.25	\$1.69 21.32 225.04 16.92 134.68 84.49 95.43 123.52 143.37 85.84 19.74 218.38 167.28 333.80 167.28 87.19 254.59 128.82 270.04 46.47 17.26 58.66 79.07 60.80 5.64 19.51 19	\$67.65 103.40 332.90 127.33 112.01 141.27 164.98 208.85 164.98 200.01 295.41 52.84 199.31 96.12 211.15 188.14 154.39 100.47 97.76 205.21 126.79 236.07 236.07 24.47 54.79 45.09 45.09 45.09 46.12 47.50 47.6	\$2.95 1.09 6.38 33.15 54.19 160.05 155.47 18.01 21.74 191.97 6.19 125.80 35.33 35.00 342.71 245.11 245.11 245.13 11.59 83.59 253.96 83.59	\$67.50 67.50 46.24 46.24 46.24 46.27 72.50	\$35. 14 35. 15 35. 15 35. 15 35. 15 35. 15 35. 15 35. 15 35. 15 35. 15 35. 15	\$347.65 427.93 573.96 870.98 481.59 839.61 740.59 801.12 775.67 982.59 779.71 1,104.89 860.38 1,759.19 1,069.32 3,782.19 2,117.34 500.43 1,218.90 663.92 1,324.06 471.72 563.29 510.76 498.87 335.25 365.22 315.73 981.85 277.41 559.50 334.66	53 82 462 95 290 181 523 493 612 281 153 885 700 1,305 740 456 1,020 456 516 516 516 517 245 255 740 277 245 255	hr. mir. 15 3 9 33 15 2 30 19 54 12 29 14 06 18 15 21 11 12 41 2 55 32 16 23 55 49 13 24 43 7 53 37 37 19 2 33 37 37 37 19 2 30 5 14 41 8 59 50 5 17	2011 2.3788 2170 1.3232 2171 1.1555 2172 1.1555 2172 1.1902 1.172 2.165 2172 2.165 2172	4.6 5.3 2.2 3.1 3.3 1.4 2.9 3.4 3.1 3.3 2.0 3.5 4.2 2.5 1.9 2.0 3.6 6.6 1.2 1.4	135. 85  26. 19 192. 64 42. 19 59. 32 56. 81 42. 50 46. 38 61. 47 185. 05 34. 24 35. 97 35. 74 43. 26 479. 77 38. 84 32. 40 34. 88 33. 18 69. 07 181. 42 80. 72 66. 05 62. 70 173. 02 47. 41 154. 46	
Total	\$4,231.51	\$823.16	\$1,915.29	\$1,290.53	\$530.97	\$1,557.72	\$3,228.24	\$5,194.39	\$7,578.45	\$1,973.92	\$1,388.32	\$29,712,50	13,419	476 53	40,413	3.1	\$62.30	\$.74

# THE GOSPORT FLYING-BOATS

E are able to publish this week drawings and specifications of six different types of flying-boats laid down by the Gosport Aircraft Co., of Gosport and Southampton. This firm has specialized in flying-boats for some time past, and has delivered many to the British Government. The six flying-boats referred to have been designed to meet a variation in requirements for future commercial aviation that appears to cover pretty well all the different purposes to which a flying-boat could be put. They range from a large 10-seater of over 100 feet span to a very small single-seater of only 23 feet span, as may be seen from the following specifications :-

#### The Gosport "Fire Fighter" 720 h.p. 10-Seater Flying-Boat

This large boat was designed with a view to carrying men and material in the quickest possible manner to the scene of a forest fire or other emergency, which may arise in such countries as Canada, where large lakes and rivers abound, surrounded in many instances by forest or heavily wooded

This type, however, can readily be adapted for long-distance

passenger or goods traffic, and is designed to withstand continuous rough and heavy service.

Balanced controls are fitted throughout, enabling the boat to be easily handled and controlled, even in bad weather.

Tanks are provided capable of holding sufficient fuel for a ron-stop flight of approximately 400 miles.

non-stop flight of approximately 400 miles.

Span (top)	 .103 ft.
Span (bottom)	 . 73 ft.

Useful load (fuel, crew of 10, gear or supplies, and wireless)
Gasoline capacity
Oil capacity 15 galls.
Two 360 h.p. Rolls-Royce (other types fitted if de-
sired).
Gasoline consumption per hour (full power) 46 galls.
Oil consumption per hour (full power) 2 galls.
Duration at full power
Duration at cruising speed
Top speed fully loaded
Ceiling with full load

#### The Gosport "Mail" Boat Six-Passenger Boat

This type has been evolved with the main object of fulfilling the exacting requirements of a long-distance passenger, mail, and goods-carrying boat. Special attention has been directed toward the comfort and safety of the pilot and passengers. The seating accommodation is particularly spacious and comfortable. The handling of the boat is rendered easy even at low speeds by the ample area of the control surfaces. The wings of this machine are made to fold back.

Span (top)
Span (bottom)
Length41 ft.
Chord 7 ft. 6 ins.
Gap
Area of main planes
Weight fully loaded
Useful load (fuel, mail, and six passengers)2,000 lbs.
Gasoline capacity92 galls.
O.l capacity
CrewPilot and mechanic

Two 280 h.p. Rolls-Royce (other types fitted if desired.

Gasoline consumption per hour (full power) .......37 galls.
Oil consumption per hour

(full power).......1½ galls. Duration at full power..2½ hours

Duration at cruising speed 5 hrs. at 70 m.p.h. Top speed fully loaded 100 m.p.h. Landing speed fully load-

### "Gosport" Patrol Boat 280 h.p. Two-Seater, with Wire less Outfit

This boat has been designed to fulfill the requirements of the Colonies for a fast patrol or police boat, and will be found to possess the qualities of a first-class Service scout. It is equipped with a wireless transmitting and receiving set.

The pilot and wireless operator have an uninterrupted view. Fuel tankage is provided for a six hours' patrol at cruising speed, and from a stationary start this type will climb 100 feet in about 350 yards.

Span
Gap 6 ft.
Area of main planes520 sq. ft.
Weight fully loaded2.820 lbs. Useful load 880 lbs.
Gasoline capacity50 galls.
Oil capacity 6 galls.
280 h.p. Rolls-Royce (other types fitted if desired).

Gasoline consumption per hour (full power) ......18½ galls.

TOURING	TOURING BAT BOAT
The second secon	THE WILLIAM
TEN SEATER	MAIL
PATROL	"SHRIMP"

Oil consumption per hour (full power)3/4 gall.
Duration at full power
Duration at cruising speed6½ hrs. at 60 m.p.h.
Top speed fully loaded
Landing speed fully loaded
Ceiling with full load

# The Gosport Two-Seater Touring Boat (Tail Boom Type)

This boat has been designed upon lines that have found favor in America. It will appeal to the sportsman pilot who prefers the "Tail Boom" or "Bat-Boat" type of aeroplane. The hull is arranged for pilot and passengers seated side by side, and dual control may be fitted, if required, for instruction. The climb is well over 500 ft. a minute and the machine is capable of attaining a height of about 14,000 feet.

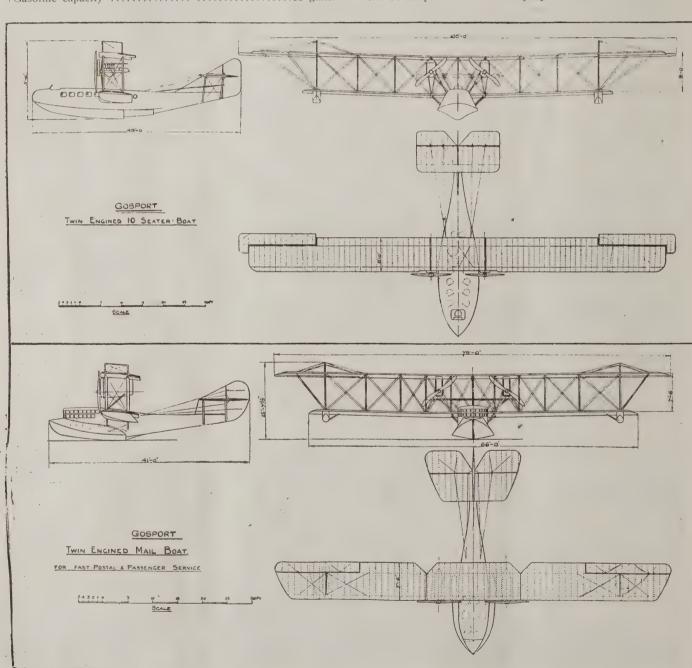
	_	* *		
Span (top)				40 ft.
Span (bottom)				28 ft.
Length				25 ft.
Chord				5 ft. 6 ins.
Gap			5 ft. 3	3 ins. to 6 ft.
Area of main plan	es			340 sq. ft.
Weight fully loade	d			2,000 lbs.
Useful load (pilot,	passeng	er, fuel an	d luggage).	650 lbs.
Gasoline capacity .				33 galls.

Oil capacity
Gasoline consumption per hour (full power)13 galls.
Oil consumption per hour (full power)5½ pints
Duration at full power
Duration at cruising speed
Top speed fully loaded
Landing speed fully loaded
Ceiling with full load

#### The Gosport "Popular" Type 160 h.p. Two-Seater Touring Boat

This boat, which is capable of a non-stop journey of 240 miles, has been designed with special regard to the comfort of the occupants, who are sheltered from the wind in a luxuriously-appointed cabin, which can be electrically heated and lighted if desired, and is fitted with windows of non-splinterable glass.

The motor is strongly mounted on steel struts, and is enclosed in a sheet metal cowl specially designed to give easy access to the carburetors, magnetos, and overhead gear. The planes can be made to fold, thus enabling the boat to be housed in a small shed. This boat, fitted with dual control, can be adopted for "School" purposes.

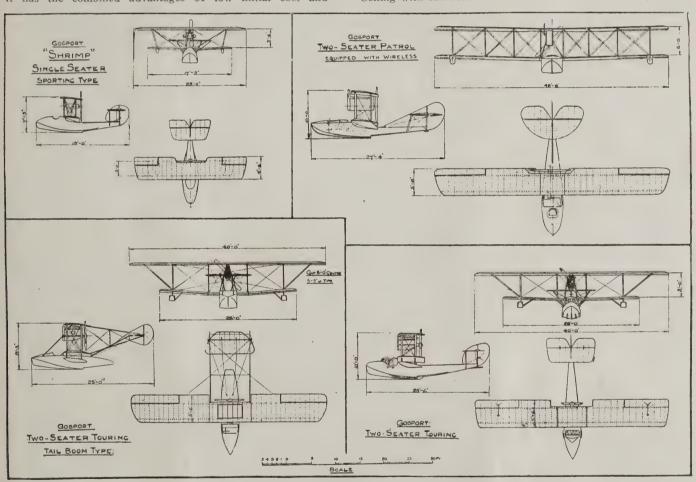


Span (top)
Span (bottom)
Length
Chord
Gap
Area of main planes
Weight fully loaded
Useful load
Gasoline capacity
Oil capacity
160 h.p. Beardmore (other types fitted if desired).
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)13 galls.
160 h.p. Beardmore (other types fitted if desired).
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)
Gasoline consumption per hour (full power)
160 h.p. Beardmore (other types fitted if desired).  Gasoline consumption per hour (full power)

# The Gosport "Shrimp" 50 h.p. Single-Seater

This diminutive boat will appeal to either the sportsman or business man who wishes to act as his own pilot. It is an ideal boat for the man residing on an island or up river, and it has the combined advantages of low initial cost and economical flying expenses. The engine is an air-cooled twocylinder horizontally-opposed unit of 50 h.p., and only requires little more attention than any high-powered motorcycle or light car unit. The boat has a low landing speed, is stable, and most simple to fly, which factors are naturally most important for confined river or lake work. The truing up of the boat generally is a very easy operation owing to the simple design.

Shipte design.
Span (top)       .23 ft.         Span (bottom)       .17 ft, 3 ins.
Length
Chord (top)         .4 ft. 6 ins.           Chord (bottom)
Gap       3 ft. 6 ins.         Weight fully loaded       .750 lbs.
Area of main planes
Useful load (pilot, fuel and luggage)
Oil capacity
Gasoline consumption per hour (full power)
Duration at cruising speed. 5 hrs. at 55 m.p.h. Top speed fully loaded 65 m.p.h.
Landing speed fully loaded
Cennig with run load



#### Book Review

Dyke's Automobile Encyclopedia. This comprehensive compendium of information for the automobile and aeroplane engine repairman is now in its tenth edition.

The book covers practically every phase of the automobile industry and deals with automobiles, trucks, tractors, motorcycles, aeroplanes, aeroplane engines, including the Liberty engine, fully illustrated. Then there are many other subjects which the average repairmen must know about, such as fitting pistons and piston rings, etc. In order to do this work intelligently he must know how to

work in thousands part of an inch. This subject is so simplified even the laymen could do this work after studying the instruction. The price of the book is \$5.00.

AVIATION. Theorico - Practical Text Book for students by Benjamin M. Carmina. As chief instructor at a large aeroplane mechanics' school Mr. Carmina gained considerable experience in presenting the theory of aeronautics to men of average education. This is reflected in his book, a work for the practical mechanic and aspiring aviator. Although applied aeronautics is emphasized in the work, particularly in the chapters on rig-

ging and maintenance, the theory of flight and of aerofoils is presented in a skilful and logical manner. A knowledge of the theoretical fundamentals is essential to the aero mechanic, but the danger that a too technical presentation of theory is given has been avoided in this book. It is a welcome addition to elementary aeronautical literature.

The book is divided into six chapters: Chapter I, Theory of Flight; II, Aeroplane Construction; III, Rigging; IV, Propellers; V, Maintenance; VI, Flight Hints.

This book is procurable at the Aeronautic Library, Inc., 299 Madison Avenue, New York.

### A MECHANICAL "PROP-SWINGER"

HE dangerous process of "swinging the prop" in starting an aero engine is one of the problems in aviation that has constantly received the attention of designers. The device invented by M. Odier, illustrated herewith, comes very near to solving the problems. Its weight is by no means excessive, and therefore it possesses a distinct advantage over other types when carried on the machine.

Briefly, the Odier starter consists of a "bipod," carrying at

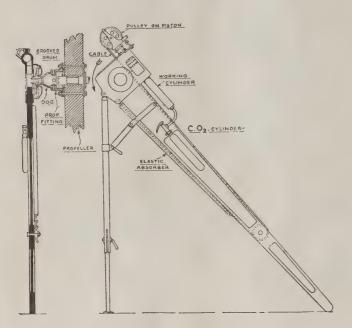
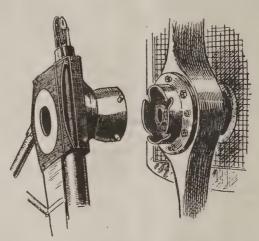


Diagram of the Odicr aero-engine starter. Compressed Carbonic gas supplies the power

its upper end a long steel cylinder and piston. Attached to the extremily of the piston, which projects outside the cylinder, is a pulley over which a cable is passed, having one end fastened to the cylinder and the other end wound four times round a grooved drum and then secured to an elastic absorber. The grocved drum is mounted on a short shaft having a bellshaped (x.r. mity on which four projections are placed symmetrically around the periphery in such a way that they can be made to engage with sloping recesses in a standard fitting mounted on the boss of the propeller or tractor screw. Mounted on the apparatus is a small tube or reservoir, containing l.qu'd carbonic acid and connected up to the cylinder. The operation of starting-up is as follows:—The apparatus—which can be adjusted in height by means of the telescopic leg shown—is held so that, with the legs resting on the ground, the driving dog is brought into contact with the fitting on the air screw. On pressing a small lever, pressure from the CO<sub>2</sub> reservoir forces the piston outward, thereby tightening the cable around the drum and causing the latter to make two sharp revolutions. The propeller is thus also rotated and the engine started, and through the angle given the recesses in the air screw fitting, the starter is pushed forward and disengaged. Should the engine backfire, neither the apparatus nor the operator are in any way injured, for as soon as the drum rotates in the opposite direction it brings the



The driving coupling of the Odier portable aero-engine starter

piston back, against the already expanded gas, when the cable becomes slack, leaving the drum free to rotate indefinitely.

The carbonic acid flasks are similar to those used for fireextinguishers, flame-projectors, etc., each flask being capable of giving five starts with a 300 h.p. Hispano-Suiza engine. Larger flasks are also supplied. Hundreds of these starters have been used on all types of engines, such as the 130 h.p. Clerget, 200 and 300 h.p. Hispano-Suiza, 400 h.p. Liberty, 350

Napier, Rolls-Royce, etc.

That this starter is easy and speedy in operation is proved by the fact that at a certain aerodrome an apprentice, 15 years old, started six machines in seven minutes. On another occasion a 400 h.p. twin-engined Borel-Odier postal seaplane had to make seven forced descents upon the water owing to a had to make seven forced descents upon the water owing to a leak in the radiator. As it was very rough, starting by hand would have been out of the question, but fitted with the stationary type Odier starter—which is bolted on the crankend, with operating controls situated inside the cockpit fourteen successful starts were easily accomplished.

# AIRSHIP TRANSPORTATION

N the effort to arouse interest in airship transportation throughout the United States, Mr. Vincent S. Stevens, secretary of the Akron Chamber of Commerce, is conducting a widespread cam-paign by appealing to the various Cham-bers of Commerce through the following comprehensive letter

The Chamber of Commerce of Akron, Ohio, invites you to join in a national movement to acquaint Congress with America's immediate need for constructive action toward the building of a commercial air fleet which will be in a position to compete with those of Great Britain, Germany and other foreign nations before those countries acquire the same supremacy in commerce of the air that they have enjoyed in commerce of the

seas.
"In the United States comparatively few civilians have come to realize that the day of commerce of the air by dirigible air-

ship and aeroplane has arrived, and that already Great Britain is found in the familiar position leading all competitors in the construction of dirigible airships, and with plans for tying together her vast empire, including Australia, New Zealand, India, the Africas and Canada with speedy straight line air service, using airships of man moth size and capable of carrying many tons of mail, cargo and passengers. Germany is also active in improving and building giant Zeppelins and preparing them for immediate use in competition for

world commerce.
"As Akron is the center of dirigible construction in the United States, it might he thought that the Akron Chamber of Commerce has its own particular ends to attain in furthering such a campaign as this. Akron would indeed be proud to add to her prestige through the enlarging of the balloon industry in this country, but there is a far more vital issue at stake,

and one has only to study the plans of the British Air Ministry as presented through the London press, and to note the vast appropriations of Government funds that are being made in the face of an extremely burdensome war debt, to realize that England means business in setting out for the supremacy in the com-mercial air business. It may be of intermercial air business. It may be of interest to know that the Akron factories have aided the Government's air service by building 56 dirigibles, 1,214 observation ballons and 55 spherical balloons.

"The construction of monster airships is too big a problem for any one corpora-tion to finance The problem can only be met through proper appropriation of Government funds. This is the method in use in England. Funds are needed to provide for the design and construction of ships, landing fields and mammoth construction and docking facilities. The Navy and the (Continued on page 66)

# THE CATO 72 H. P. AERO ENGINE

#### General Description

T HIS engine is a two-cylinder, horizontally opposed, four-cycle, air cooled valve-in-head type. Bore, 5 inches; stroke, 6 inches; piston displacement, 235.63 cu. in.; compression ratio, 433-1; weight complete, ready to run, 134 lbs., corresponding to a specific weight of about 1.86 lbs. per horsepower. The rated horsepower is 72 at 1825 R.P.M.

#### Crankcase

The crankcase is a two-piece aluminum alloy casting, split vertically and securely bolted together by standard S.A.E. %" bolts. The engine is bolted to the fuselage by eight %" bolts set at a large pitch diameter at the rear of the crankcase. The interior of the crankcase is well flanged to allow cooling, and as well gives an extremely rigid construction combined with light weight. The rear of the crankcase forms the gear-case housing. The gear-case cover, magneto bracket and oil pump plunger barrels are cast integrally.

#### Valve Gear

The actuating mechanism consists of one camshaft with two cams, one inlet cam and one exhaust cam, operating four tappets, each connected to its valve push rod. The tappet rollers are ball bearing. The camshaft is mounted on the outside race of a ball bearing; the inside race is mounted on the crankshaft and the camshaft is free to rotate on this ball bearing. The camshaft or camhub and gear are in one piece, cut from a solid steel forging. The camhub is driven at half crankshaft speed by internal gearing. Three idlers or planet pinions are used, mounted on ball bearings. The driving pinion on the crankshaft drives the planet pinions as well as the pump reduction gears. The valve push rods are of the tubular type with adjustment on one end. The valve rocker levers are mounted on ball bearings with the outside race cut in the rocker lever and the inside race cut in the rocker lever pin.

#### Cylinders

The cylinders are machined from solid steel forgings weighing 186 lbs. before and 1134 lbs. after machining. Fifteen cooling fins are machined on the outside of the barrel. A little below the lower cooling fin eight holes are drilled, equally spaced to allow air circulation to piston head.

#### Cylinder Head

The cylinder head is a gray iron casting with 6 cooling nns cast around and 9 across the head. These cooling fins allow ample cooling surface over the entire head and hot valves, so common in air-cooled engines, is therefore entirely eliminated.

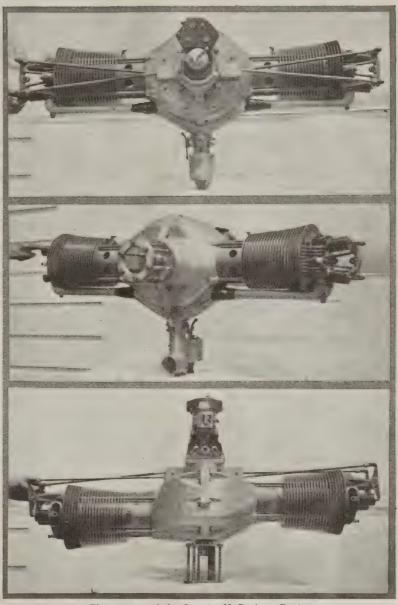
mon in air-cooled engines, is therefore entirely eliminated. Two spark plug bosss are provided, one on each side of the cylinder head between the valves. The cylinder head and cylinder are bolted to crankcase by means of long studs running the length of the cylinder and cylinder head. This brings the parts under compression, which is much more to be preferred than tension.

#### Crankshaft

The crankshaft is machined from a solid steel forging. It is of the double throw type with crank pins set at 180° and mounted on two ball bearings. The inside race of the front bearing and the two crank-pin or connecting-rod roller-bearing races are machined on the crankshaft. The front flange for the propeller is machined integrally with the crankshaft. This shaft is of liberal size—29/32 inches in diameter—bored hollow throughout to insure minimum weight with maximum strength.

#### Connecting Rods

The connecting rods are of one piece construction, machined from a solid steel forging, and are of the "H" section. No bronze bushing is provided for the piston pin end, but these are fitted roller bearings. The outside race is formed by the connecting rod, while the inside race is the piston pin. The big end or crank pin end is solid with the outside roller race machined in the rod. This construction makes a short "H" section which is unusually light and consequently strong.



Three views of the Cato 72 H. P. Aero Engine

#### Pistons

The pistons are cast of auminum alloy fitted with one Inland ring above the piston pin. The piston pin is free to oscillate directly in the piston pin bosses and has bronze buttons at each end to prevent wear on cylinder wall. The crown head is strengthened by eight webs radiating from a central boss in the piston crown. The formation of these webs is such that they act as cooling fins for the air circulating through piston at every stroke to carry heat off from the piston crown. Between these cooling fins, and equally spaced, air circulating ports are drilled. The piston pin, on which the rollers of the small end of connecting rod run directly, is bored hollow, hardened and ground. These pistons are of very light weight, which is of great importance to minimize vibration.

#### Valves

Two poppet valves are located in each cylinder head and all valves are interchangeable. The valves are 2¾" in diameter. Excepting that the valve stem is comewhat shorter, the valve assembly is interchangeable with that of the Liberty engine.

#### Lubrication

The oiling system is of the dry sump, non-circulating type. Oil pressure is provided by a dual plunger pump drawing oil from a supply tank in the fuselage and delivering a small quantity to each of the cylinders every seven and a half revolutions of the crankshaft. On the down stroke of the plungers a small quantity of oil is delivered into the gear case, lubri-

cating the oil pump reduction gears and the valve operating mechanism. The main bearings, crank pin and piston pin bearings are lubricated from oil spray in the crankcase.

#### Ignition

The ignition is accomplished by a Bosch magneto mounted directly opposite the rear end of the crank shaft and is driven from the end of the crankshaft at the same speed.

#### Carburetion

Carburetion is secured through one special Zenith carburetor Carburetion is secured through one special Zenith carburetor and is bolted directly to the crankcase, in which the intake manifold is cast. The manifold from crankcase to the cylinder head is located quite close to the cylinder, which is kept warm by the cylinder heat. The carburetor being bolted to the crankcase not only makes a very rigid mounting, but adds materially to the cooling of the crank case as well as warming the

#### General Data

Number and arrangement of cylinders	2 opposed
Valves	
Included angle	180°
Bore	5"
Stroke	. 6"
Area of one piston head	
Total piston head area	
Swept volume of one cylinder	117.82 cu. in.
Clearance volume of one cylinder	
Total volume, including clearance volume	152.97 cu. in.
Compression ratio	. 433-1
Piston displacement	235.62 cu. in.
Horsepower72 a	t 1825 R.P.M.
Type of valve gear	

Internal gear, driven camshaft with overhead rocker levers

and push rods.	
Cooling system	Air
Valves per cylinderOne inlet, or	ne exhaust
Outside diameter	2.3/4"
Port diameter	21/2"
Width of seat	2½" ½"
Angle of seat	30°
Valve lift inlet	7/16"
Valve lift exhaust	3/8"
Diameter of stem	7/16"
Length of valve	41/4"
Number of springs per valve	concentric
Length of spring in position	2 3/16"
Mean diameter coils—large spring	1 7/16°
Mean diameter coils—small spring	1"
Exhaust rocker clearance	.020"
Inlet rocker clearance	.015"
Included angle of valves	13°

#### Cylinders

Material	Steel-machined	from solid
Over-all length		103/4"
Length of projecting in cran	kcase	3/4"
Diameter over cooling fins		73/4" Max.
Diameter over cooling fins		63/6" Min
Space between cooling fin cen	iters	3/8"
Number of cooling fins		15
Thickness of fins		1/16"
I hickness of flange at base.		3/16"
Width of Hange at base		3/16"
Number of studs		4
Diameter of studs		3/8"
Studs holding	Cvlinder head an	d Cvlinder
Thickness of cylinder barrel.		1/8"
Number of air circulating port	s for piston cooling	8
Location of air circulating po-	rts	
27/11 -1	1 .	44 4

2\%" above base of cylinder, equally spaced

Diameter of air circulating ports	11/8"
Cylinder Head	
Material	Gray iron
Over-all height	33/4"
Number of cooling his	6
Diameter over cooling fins	81/8" Max.
Diameter over cooling fins	7½" Min
Inickness of cooling fins	1/16"
Space between cooling fin centers	3/8"
Number of cooling fins across head	9
Height of cooling fins across head	1½" ½" ½" 2½"
Thickness of combustion chamber wall	1/1"
Thickness of valve ports	1/2"
Diameter at valve	21/2"
Area of port at Hange	3.142 sq. in.
Number of spark plug bosses	2
Piston	_
MaterialAlum	volte munic
Type of piston head	Crowned
Length of piston	476"

Length of piston .....

Number of rings per piston	1 inland
Position of ring	piston head
Width of ring	3 13/32"
Thickness of head	3/16"
Cooling fins in piston head	8 equally
spaced cooling fins radial from central boss.	1/7
Thickness of cooling fins	1/8"
Number of air circulating ports	8
Location of air circulating ports	11/4"
above center of piston pin to center of air circulating port and equally spaced around pis-	
ton between cooling fins.	
Diameter of air circulating ports	11/8"
Diameter of piston pin	11/4"
Thickness of piston pin boss	3/16"
Thickness of piston skirt	1/8"
Connecting Rods	
TypePlain—solid	bearing ends
Length between centers	10½"

180°

35/8"

134 lbs. About 1.86 lbs 2 lbs. 86 lbs. 66

Type	d bearing ends
Length between centers	10½"
Piston end bearing	.Roller bearing
Crank pin end bearing	
Type of section	
Depth of section	11/4"
Width of section Thickness of web	3/4"
Thickness of web	1/8"
Thickness of flange	
Crankshaft	
Type	Double throw

Diameter of crankshaft magneto end Diameter of crankshaft trank pin bearings	13/4" 29/32"					
Crank webs:						
Width	25/2"					
Width	7/8" center					
Thickness						
Radius of fillets						
Weight of shaft with propeller flange	15 lbs.					
Comphate						

Included angle of crank pins

Diameter of camshaft.....

Length of camshaftg <sub>32</sub> " including gea	r
Inside diameter	
Number of bearings	
Type of bearing Ball bearing	v
Width of cam face	2
Number of cams 1 inlet I exhaus	t
Inlet cam operating Both cylinder	
Exhaust cam operating Both cylinder	
Pitch diameter of gear 4.20"	
Number of teeth	
Width of face	
MaterialSteel—machine from solid	4
Camshaft housing Box type Material Aluminum allog	
	y
Planet pinion:	
BearingBall bearing	
Pitch diameter 1.05	

Pitch diameter	1.05
Number of teeth	
Width of face	1/2"
Crankcase	
Material Alu	minum alle
Type Sp	lit vertical
Type	3_"
Thiskness of ordinder pade	8/, #

Thickness of cylinder pads	84 "
Cylinder base to crankshaft center	618"
Valve Mechanism	
Rocker leverSteel—	
Length over all	_45/8".
Bearing	Ball bearing
Push rods:	
Type	Tubular
Adjustment clearance	One end
Valve tappets:	

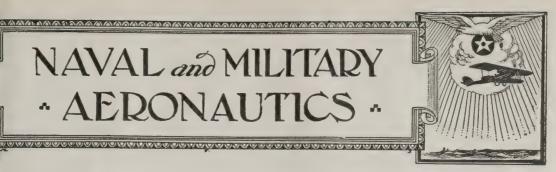
vaive	tapp	ets:					
Length .				 	 		23/8"
Type				 	 Square-2	working in	same housing
Roller .				 	 		Ball bearing
Width of	f rol	ler		 	 		3/8" 1 3/8"
Width of	tap	pet		 	 		13"
Thicknes	e of	tanı	net				5/8"
Material				 	 	Steel	cut from solid
THEGUCATUA					 		

Type Force feed	non-circulating
Type of pump	Plunger
Number of plungers	2
Ignition	
	Magneto
Type	Magneto Bosch
Number of plugs to cylinder	2
Type of Plug	A.C.
Ratio of magneto speed to crankshaft	1—1
Carburetor	

Make Size	1 3/4"
Cooling System	Air cooled
Over-all Dimensions Width	461/8"
Length	461/8" 23 1 8" 201/4"



# NAVAL and MILITARY AERONAUTICS



#### Mineola Aviators Fly in Fog for Pershing Parade

New York, N. Y.—In the densest haze any of them had ever attempted to navigate fourteen pilots from Hazelhurst Field, Mineola, flew over New York City on September 10 in tribute to General Pershing and the officers and men of the First Division as they paraded down Fifth Avenue.

In the squadron were nine Curtiss aeroplanes, four De Havilands and one Caproni. The pilots of the Curtiss machines were Captains Leary, Simonin, Allen and Reel and Lieutenants Richards, Manzman, Garrat, Torney and Pennewell. The De Havilands were piloted by Captain Kenly and Lieutenants Roullot, Coats and Norris. In the Caproni was Lieutenant Melvill. Each of the flyers carried a passenger and Lieutenant Torney was accompanied by a photographer, who was to take pictures of the parade.

There was much comment along the

line of march during the first two hours over the absence of the usual flyers. Captain Simonin said afterward that the reason for the late arrival of the aeroplanes was that the atmosphere was so thick during the morning that flying was not safe. As it was some of the machines safe. As it was some or the were almost in collision with the buildings before the pilots could get their bearings through the heavy mist.

# American Legion Post at Three Rivers, Indiana, Holds Aerial Exhibition

Three Rivers, Ind .- In connection with the home-coming celebration for returned soldiers and sailors, held by the Thomas K. Hice Post of the American Legion, a flying exhibition was given by aeroplanes of the Indiana Aeroplane Corporation of Marion. Since July 11 this company has carried over three hundred passengers.

#### Veterans Protest Sale of Decorations

Washington, D. C .- The War Department has made public the reply of Major General Henry Hervey, assistant to the Chief of Staff and director of operations, a communication from Warren S. her, Commander-in-Chief of the United American War Veterans, protesting the sale of service medals. Secretary War Baker requested, at the beginning of the present session of Congress, that a bill be passed authorizing the presentation of decorations to men now out of the service. Pending the passage of the bill, it is necessary to require pay-cordance with existing legislation. it is necessary to require payment in ac-

Mr. Fisher also protested the "promis-cuous distribution" of the Distinguished Service Cross, stating that it should be awarded only for bravery on the line of battle. General Hervey states that this policy has been invariably adhered to and the Distinguished Service Medal is awarded for non-combatant services.

#### Signal Corps Recruiting Campaign

Washington, D. C .- The War Department authorizes publication of the follow-

ing information:
"A special effort will be made to enlist men for the Signal Corps, concentrated upon securing men possessed of common school education or better, who are interested in, or who give promise of being able to acquire one of the following trades: Radio operators; Morse telegraph operators, able to use typewriting machines; telephone and telegraph linemen; telegraph operators; telephone repairers; electricians; switchboard operators and cable splicers."

#### Commission to Distribute Captured Zeppelins and Seaplanes Being Appointed

The Allied commission which will take

over the German Zeppelins and seaplanes met in Cologne, August 10. Up to the present the United States Navy is rep-resented but not the Army. The question of an Army representative is now under consideration by the War Department.

It is expected that the organization of a commission will take some time. the peace treaty has been ratified by three great powers the commission will then proceed into Germany to conclude arrangements for the transfer of aircraft, according to the provisions of the peace terms. The question of allotment will be decided after a full survey is made.

#### A. G. O. Supplies Official Military Records

Washington, D. C.-The War Department authorizes publication of the following from the office of the Adjutant Gen-

'A large number of applications for information from the official records of the War Department are made through attorneys employed for the purpose.

"The employment of the services of an attorney is unnecessary for this purpose. Applications for information from the official records may be addressed by the person directly interested in obtaining to The Adjutant General of Army, Washington, D. C., who will furnish it to the applicant direct, provided such information can properly be furnished under existing rules of the War Department." ment.

#### Status of Air Service Instruction Manuals

The following is the status of 21 manuals being prepared by Training and Operations Group, Air Service:
No. 1—Aerial Navigation—Complete

200 copies being stenciled.

(Continued on page 66)



The Gourdon monoplane, equipped with 180 H. P. Hispano-Suizo, several of which were purchased by the U. S. Air Service in France, and are to be shipped to the United States.



# FOREIGN NEWS



Bankers Fly Over Holland in R-33
London.—Carrying the chef and head waiter of a prominent London restaurant, the airship R-33, a sister ship of the R-34, departed on Sep.ember 10 from the aerodrome at Pulham, Norfolk, for a flight over Paris, Boulogne and Amsterdam. Aboard were ten financiers in addition to the officers and crew, and the voyage lasted two days, but every means poss.ble had been employed to make the voyagers comfortable.

tion to the officers and crew, and the voyage lasted two days, but every means possible had been employed to make the voyagers comfortable.

One report states that the primary object of the trip is to survey in detail the cin is of Holiand, but it is declared officially that there is nothing to be done except to advertise the aggressive policy of Great Britain in civil aviation.

Sufficient tooustums have been taken aboard to provide elaborate meals. The menu for dinner, for example, comprises soup, cold trout, roast lamb, vegetables, omelette and coffee. This is to be served during the voyage across the Channel. The return of the airship is expected on September 13.

Paris Aero Show in December
Paris.—Arrangements for the sixth Paris Aero Show, which is to be held at the Grand Pala's between December 19, 1919, and January 4, 1920, are being rapidly pushed forward. The show is under the auspices of the Chambre Syndicale des Industries Aeronautiques of 9 Rue Anatole de a Forge, Paris (17e). It is understood that all the preminent continental and British aircraft manufacturers will exhibit machines.

National Aerial Police System for Germany
London.—According to information received here from Berlin a network of aerial police patrols has been organized, one of the chief duties of which will be to prevent the migration of capital from Germany. A landing place has already been laid out at the Swiss border and others are being laid out at Hamburg, Hanover, Bres.au and other towns

towns. It is reported that an attempt to smuggle 20,000,000 marks to Switzer and from Berlin was frustrated by a formation of three aeroplanes which were sent in pursuit. They overtook the Basel express at Nurnberg, apprehended the criminals and captured the money.

Breguet Biplanes Fly from Paris to Cairo via Constantinople
Paris —Two Breguet biplanes, one piloted by Commandant Vuillemin
and the other by Lieutenant Dagnaux, made a flight of 4,250 kilometers between Paris and Cairo in the following siages: Paris-Totres
(near Marseilles), Totres Naples (850 kilometers in 8 hours), NaplesSalen ki (800 kilometers in 6 hours), Saloniki-Constantinople (550 kilos,
4 hours), Constantnople-Cairo (1,300 kilos, time not g ven).
Commander Vuilnemin arrived on September 9 at Villacoublay from
Cairo, Egypt, having flown about 2,500 miles in three flights. The first
stop was made at Constant.nople, the second at Istres, twenty-three
miles west of Marseilles, and the third at Villacoublay.

1.300 Miles of Seaplane Service for Belgian Congo
Brussels.—2,000,000 francs has been appropriated for the establishment of a seaplane service in Belgian Congo. The line is to be divided into three sections; Stanley Pool to Coquilhatville (600 miles); Coquilhatville to Lisala (300 miles), and Lisala to Stanleyville (400 miles). A large workshop where extensive repairs can be made is to be erected at Stanley Pool.

The personnel of the service, besides a director and six pilots, is to consist of 8 mechanics, 5 carpenters, a secre ary and 80 laborers. A pilot will be able to earn 19,000 frances in fixed salary, and 12,000 flying pay; a skilled workman 12,000 fixed, and 3,000 extras (which may be 8,000 if he flies).

French Aerial Passenger Fares Low
Paris —The statement that commercial aviation is not a good business proposition is refuted by the results of the operations of several French



The Distinguished Flying Cross and the Air Force Cross which has been given to Hawker, Reed, Brown and Alcock

companies who have been active in carrying passengers in France, in-cluding Societé des Avions H. and M. Farman, Cie des Messageries Aériennes, Cie Aériennes Française, Cie de Navigation Aérienne, Cie des Grandes Expresses Aériennes, Societé des Transports Aeronautiques du

Grandes Expresses Aériennes, Societé des Transports Aeronauques.
Sud-Ouest.
Fares and freight rates are reasonable, being from one to two francs per kilometre, according to the size of the machine. The fares in the large 'buses average 1f. 25c., or 1s. a kilometre. The fares are:—From Paris to Lille, 250f.; from Paris to Brussels, 365f; from Paris to London, 400f.; from Biarritz-Bordeaux, 200 f.
Freight, 10f. per ton per kilometre. The amounts paid for passengers and third party insurances amount to 20 per cent. of the fares.
Now that the subsidies are established, the amounts paid for carrying the post pay all running expenses, so that freights and passengesr represent profits.
Commercial aviation does show a profit even now, and next year the activity in France will nearly equal that during the war. There are seven other companies getting ready to operate next Spring in addition to those who propose working for British companies.

Large French Aeronautic Mission to Argentina
Paris.—A party, consisting of 16 French officer pilots and 44 picked
mechanics, have embarked for Buenos Aires in connection with the
French Avia ion Mission to the Argentine Republic It is proposed to
introduce a measure in the Argentine Chamber of Deputies providing
for admission of aeroplanes into the country free of duty.

British Company Starts Paris-Brussels Service
London.—The Handley-Page Company started a Paris-Brussels service
on September 1st, according to Flight. This is the first instance in
which a foreign company is operating a service entirely outside of the home country

Eighteen Passenger Caproni Flies Over Alps
According to a cab egram made public by Dr. B. G. Cantu, American representative of the Caproni company, a Caproni eighteen passenger triplane made a successful flight over the Alps. The cablegram reads: "Caproni triplane, fitted with Liberty motors and eighteen-passenger cabin, flew from Milan across the Alps to Lyons, Paris, Brussels and Amsterdam on its way to London."

Amsterdam.—The Amsterdam Aircraft Exhibition has awakened an intense interest among the Dutch population in aeronautics. According to the "Nicuwe Rotterdamsche Courant," a company for aerial transport with a capitalization of 10,000,000 guilders is being organized with British backing.

The first projected routes are (1) Flushing-Rotterdam-Hague-dam-Groningen, (2) Flushing-Hertogenbosch-Arnhem and connections with Germany, and (3) Amsterdam-Utrecht-Arnhem-Maastricht and connections with the South,

It is reported that the Dutch Government is negotiating for the acquisition of 24 Airco Machines.

The Nederlansche Vligingfabric has recently been organized with a capitalization of 1,500,000 florins for the manufacture and sale of aeroplanes, the est-blishment of flying schools, aerodromes, landing fields.

Mr. A. H. G. Fokker is director.

Air Ministry Plans Aid to Commercial Aviation
London.—At a meeting of promoters of commercial transport with representatives of the Air Ministry Major-General Seeley, Under Secretary for Air announced that existing machines in various stages of construction would be offered at low cost to those undertaking any sound scheme. The use of radio stations to aid air travel was pledged Government-trained personnel and government-built sheds will also be at the disposal of the industry. The military value of a well developed commercial aviation is apparently recognized.

Six-Passenger All-Metal Aeroplane Completed
The Hague.—According to information transmitted through a German
news agency, there is being shown in Berlin a new aeroplane constructed entirely of metal, capable of carrying six passengers.
The
motor is of 160 horsepower and the speed is 100 miles an hour.

Aeronautics in Switzerland

Zermatt.—What is probably the most elevated flying field in Europe has just been completed at Montana, in the Can'on of Valais, at a height of about 5,000 feet above sea level. This first of Alpine flying fields was opened a few days ago by a number of sensational flights, in the course of which the Swiss airman Rhyner circled around the summits of the Mat'erhorn and Weisshorn for several hours. These feats will be repeated regularly in fine weather, and hotel guests who are unequal to the exertion of difficult climbing or deem the dangers of flying less than those of mountaineering will be able to book sea's as passengers and skim Ightly over crags and precipices to overcome which costs the ardent Alpinist many hours of high physical tension. Aipine aviation thus bids fair to become a recognized institution in Switzerland, by which all those interested in the development of the tourist industry hope to attract new swarms of pleasure seekers to th "playground of Europe."

It is stated in Swiss newspapers that an air passenger service is being organized along a line connecting London, Lausanne, Mentone and Milan. This would mean flying over the Simplon Pass at a great height, and certainly would afford air travelers marvelous views of mountain scenery.

Military Aviation in Japan

Tokyo.—The Japanese army has purchased a few hundred aeroplanes from the French Government through the aeronautical mission of twenty pilots, twenty mechanics and five observers. An aviation school has been established at Tokorozawa, near Tokyo, and several others are being completed in various parts of the Empire. Major General Inouye is head of the Imperial Army Air Service and Major General Arikawa is commanding officer. Maurice Farman pusher machines are used for elementary training and Sopwiths for advanced instruction.

The navy has purchased a large purchased.

instruction.

The navy has purchased a large number of scaplanes of various types as follows: Maurice Farman (for preliminary training), Short, Salmson, Deperdussin, Sopwith, Nieuport, Curtiss and others.



# ELEMENTARY AERONAUTICS

MODEL NOTES

By John F. McMahon



#### CLUBS

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HIGH SCHOOL
Sedgwick & Division Streets, Chicago, II

Sedgwick & Division Streets, Chicago, Ill.

To design successfully and build model aeroplanes that will fly, many things must be taken into consideration. A great many model flyers do not know that model materials can be purchased and thereby save time in construction and also make better looking models.

I am, therefore, including in the model news for the next few issues illustrations of model parts and tools used in building models which can be purchased for small sums from the Wading River Manufacturing Company whose address can be found in the advertising columns. These people have very kindly given permission to use the photos and descriptions appearing in this article.

The article will start with the materials used in model construction and cover gliders and large machines showing methods of getting around the different difficulties encountered in the construction of size of tered in the construction of aircraft.

The last machine to be described will be one so simple that the average schoolboy will have no trouble in assembling it. I would like the readers of this page to be sure to arrange for their copies of future issues of AERIAL AGE to insure having all the articles. Generally, after articles appear on this page, readers write in a few weeks or a month later for back issues, and it may be their ill luck to be notified that our supply is exhausted. It would pay you to get in touch with the subscription department as they have very good offers to be made in regard to subscriptions.

In model construction as well as the larger machines the proper wood and shape must be used to obtain the minimum weight as well as the maximum strength, I am therefore showing the general line of cross construction. You can see at a glance the proper size and shape necessary for your par-

1 5a

ticular job. The thin pieces are used for scale models in the fuselage, wings, etc. The deeper sections are used for the frames of racing models as well as the construction of large scale models; for instance, those built to be powered with a gasoline engine.

The bottom row shows wood cut to an "I" or "H" section. These can be used for wing beams for scale models or for the frames of racing models. The wing ribs of scale models are generally made up from thin wood and cut to the proper shape while the ribs of the racing model can be made by bending a thin strip of wood or bamboo after tieing it to the wing spars.



Two well-constructed scale models made from the parts described in this article

You will also note the many different kinds of fittings that can be purchased, all of which add to the general appearance of especially a scale model. These fittings are made of seamless brass tubing and are soldered together with silver solder, thereby insuring against possibility of pulling apart. These fittings are very light and save time in assembling and dissembling.

At the bottom are sockets for interplane struts of different sizes, and one for a "V" strut or for a pontoon socket. The one in the lower right hand corner is used for Nieuport Monoplane landing chassis and is very neat. All of these sockets are made in different sizes, that is ½ in., 3/16 in.,

sockets are made in different sizes, that is ½ in., 3/10 in., ½ in., etc., outside dimension of wood.

The models shown to the right were built by the Wading River Mfg. Company and all the fittings and parts described as well as those to come are used in these models. One can see at a glance the fine workmanship as well as the faithfulness in copying the larger prototypes of these little models. In the next issue more parts will be described.



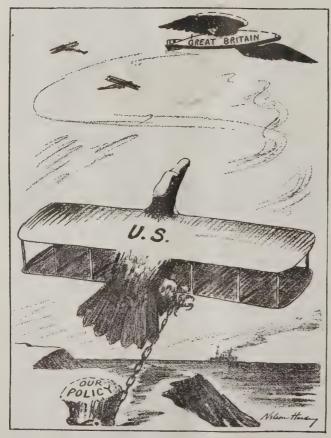
Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### The Return of Darius Green

By John W. Low, in the N. Y. Evening Sun.

Darius Green, as you all doubtless know, Was the pioneer airman, who died long ago In chagrin for a fall, when, by Fate undismayed, To fly from his daddy's old barn he essayed.

Now, the gods, who had set him the then risky job Of taming the air, were provoked as old Hob When he tumbled to earth, so they sentenced his soul To the rest-cure in that Purgatorial goal Where folks who are near-sinners here on the earth May repent and clean up and, perhaps, earn a berth In the ages to come on the lightning express Which transports the saints to the home of the blest. Now the place wasn't bad for a stopping off spot, Since the food was O. K. and it wasn't too hot, But Darius was peeved; he'd an ingrowing grouch, For he reckoned as how he "wasn't no slouch, And the gods hadn't oughter 'av done it, by gum," As he said to his bosom companion and chum, Our old friend, Micawber—for he was there, too, Still hoping that something would turn up to do. Well, time slipped along till one fine breezy day, When Darius was sailing on Purgat'ry Bay, A Marconigram that had slipped its leash here Hit the mast of his yacht and smote full on his ear (For Darius had kept up to date in the mode And was wise to electrics and knew the Morse code)—"The King and the Queen," was the message he heard, "Are back from their trip to the States, a la bird;



Yes, American Aviation is Looking Up.—

Nelson Harding in the Brooklyn Eagle

From London to New York, then back home again They flew in His Majesty's Green monoplane."

Darius was stunned; the blood flew to his head. "So!" he muttered, "they wait till they think I'm quite dead, Then dig up my patents and grab my ideas
And steal all the thunder I'd bottled for years!

I'll bet there's enough of back royalties due
To pay Pop's ol' mortgage and paint the barn, tew—
An' to think that 'ere king had the thunderin' spleen
To name his new monnyplane-flier a 'Green'!

By Jingo! I'll take a trip back an' colleck—
I'll show 'em D. Green ain't no hayseed, by heck!"
So, straight to the Purgat'ry warden he went,
And by promise to divvy up fifty per cent.,
Bribed that worthy to give him a seven day pass
To earth and return, via air route, first class—
(For even in Purgat'ry land, sad to say,
Just as here, "honest graft" still will go a long way).
And that's how it happened, some few weeks ago,
At the great international aeroplane show,
The first on the field was our hero, D. Green,
Quite the funniest figure those highbrows had seen.
All wrinkled his face, and he screwed up his eyes
Till to find them at all was a kind of surprise,
And his words, when he spoke, wheezed like wind through a slot,
In a voice like a buzz saw caressing a knot.
And he wore a white plug hat and high water pants,
And a long spiketail coat you should see at a glance
Was of '49 vintage; while under his throat
Grew a whisker that rivalled an Angora goat!

'Twas the show's banner day—full ten thousand were there
To see the prize birdmen perform in the air:
They volplaned and circled and cut "figure eights"
Like swallows awing or swift experts on skates.

"Of a truth," said Darius, "Tve come to my own—
If my wings hadn't bust, that's the way I'd 'av flown!"
Then he slyly unwound from a wad of tin foil
A radium cube, soaked in Purgat'ry oil—
(For from wise Archimedes the secret he'd pried
Of perpetual motion, to mortals denied).

Now, ready for action, our hero edged up
To a Wright, which had just won the Champion Cup,
And, quite uno In the gasolene tank where 'twould do the most good. Then seeing the driver dismount to the ground, He sprang to the vacated seat at a bound, Threw the lever "full speed," set the motor a-buzz, And was off ere the crowd e'en could guess who he was. "Whoopla!" yelled Darius. "I'll show 'em, by heck, How a real eagle flies, if I break my darn neck!" Up over the grandstand he flew like a flash, Upsetting the flagpole, which fell with a crash; Then, coattails dehantly waving behind, He whizzed round the field with the speed of the wind, Outdistancing Curtiss, outdaring Grahame-White—Great Scott was there ever so frantic a flight! So great was the wash of the wind in his wake That his rivals all ducked down to earth, hearts a-quake, And only Darius was left in the air, With plenty of leeway to fly, and to spare. "Hooroo!" yelled our hero; "Hooray! clear the track—D. Green's off for home an' he ain't comin' back!" And then, while ten thousand eyes bulged in amaze The runaway craft, wrapped in ambient haze, Disappeared in a cloud, but, still gleaming afar, The whirring propeller shone out like a star.

The sequel—we get it by wireless, of course,
For that radium cube is a marvellous force—
The sequel, we hear, was that Darius Green
Flew up till he found himself stuck in between
The centrifugal force of the sun and the moon,
Where he hasn't much chance to escape very soon;
For that, truth to tell, is the queer milky way,
Where all graviation is equal, they say,
So that any stray body just spins 'round and 'round,
Till the last day when Gabriel's trumpet shall sound.

But here's the real secret this story unmasks— That wonderful "comet," if any one asks, Called "Halley's—that's once in a century seen— Is really no comet at all—it's D. Green! There is no place in an airplane for faulty construction. Especially is this true of the spark Actual service has demonstrated the superiority of AC Aviation Plugs. They have met every emergency.

Champion Ignition Company, FLINT, Michigan



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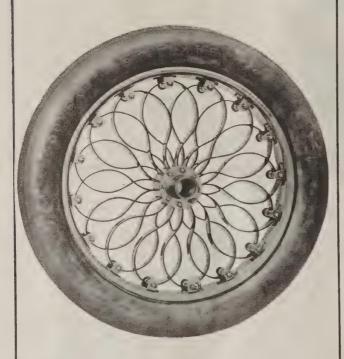
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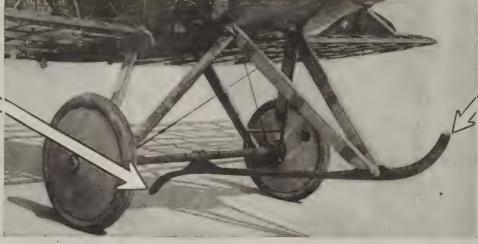
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Army air officers naturally have been among the first to see the immediate need for improving America's position, and they already have had many conferences and laid many plans. Unfortunately, however, Congress has adjourned and left these plans high and dry for lack

of appropriations.
"America has no commercial airship today, nothing but a few small ships incapable of trans-Atlantic flight and incapable of carrying more than a few passengers on any flight. America has no docking facilities for big ships. England is ready to-day with a dirigible which will soon attempt to cross the Atlantic, and will probably return without stopping here for lack of docking facilities in America.

"In the face of the after-war debt there may be considerable difficulty in convincing for the state of the state

ing Congressmen and Senators of the necessity of the appropriation in question. As a matter of national interest, we feel that this must be done, and therefore ask you to join with us in bringing this proposition before your Representatives and Senators at the earliest possible date, and also ask you to appoint a committee on aeronautics to study these matters for your organization."

#### Continued from page 59)

No. 5—Flying Manual—Complete 40 copies distributed, 50 copies now being stenciled.

No. 10-Manual of Aerial Photography -Complete now but revised before approval.

No. 17—Air Service Manual of Practical Meteorology—Available in library.
No. 23—Hand Book for Flying School Commanders—Complete and available.
No. 4—Air Service Bombing Manual—

Awaiting Photographs.

No. 11-Manual of Aerial Gunnery-In hands of printer.
No. 12—Hand Book of Aerial Tactics

& Combat—In hands of printer.

No. 13—Air Service Pursuit & Combat

Manual—In hands of printer.

No. 31—Squadron Commanders' Field
Service Hand Book—In hands of printer.

Program of Air Service Training based on Aerial Academy-Printed and ready for distribution.

No. 7—Air Service Liaison, dealing with Infantry Liaison—Complete and partially distributed.

No. 6—Air Service Liaison, dealing with Aerial Observation for Artillery—Complete and available.

No. 21—Air Service Liaison, dealing with Army Liaison and Liaison Officers' duties—Printed and ready for distribution.

No. 2—Air Service Liaison, dealing with the duties of the Operations Officer—In

hands of printer.

No. 14—Manual of Balloon Observation and Maneuvering—Being approved.

No. 15—Manual of the Balloon Winch

—Complete and available.

No. 16—Balloon Case Manual Pains

No. 16-Balloon Gas Manual-Being

approved.
No. 18—Manual of Balloon Accessory

Equipment—Being revised.

No. 19—Parachute Manual—Being approved.

No. 32—Balloon Riggers' Manual (Type R)—Use present one.

### 7,682 Air Service Men in Officers'

Washington, D. C.—A statement issued by the Statistics Branch of the General Staff, including all commissions up to August 31, shows a total of 7,682 Air Service reserve commissions of the fol-

towing runks.	37 0 1	70 - 11
Flying	Non-flying	Balloon
Colonel 1	3	
LieutCol 1	4	
Major 23	100	
Captain 102	316	
1st Lieut 458	635	
2nd Lieut4,203	1,831	15
Total 4.788	2,899	15

#### American Victory Medal for Officers Who Served With U. S. Army

Washington, D. C .- The War Department authorizes publication of the following information:

The Secretary of War has approved the issue of Victory Medal to allied officers and enlisted men who served under American command during the war, distribution to be made through respective war offices.

#### Board of Appraisers to Settle Real Estate Claims

A General Order has been approved as follows: The jurisdiction and powers conferred upon the War Department Board of Appraisers by General Order No. 30, War Department, 1918, are hereby extended to include claims arising under terms and conditions, whether expressed or implied, of leases for use and occupation of real estate by the United States Army. In making disposition of such claims, the War Department Board of Appraisers may make original investigation or refer any claim for investiga-tion and recommendation to be made as provided in General Order No. 39, War Department, 1919. The record of claim and approved recommendation by the War Department Board of Appraisers shall be forwarded to Real Estate Service for transmission to the Director of Finance for final disposition.

# Four Hour Flight from Fort Morgan, Col., to Lincoln, Neb.

Lincoln, Neb.—Lieut. E. W. Killgore, pilot, Serg. A. T. Vierra, passenger, of the Ellington Field Recruiting Squadron, and Lieut. C. C. Nutt and Sergt. J. H. Campbell flew from Fort Morgan, Colorado, to Lincoln, covering a distance of 400 miles in 240 minutes, altitude 5,000 fact.

ol. 10, No. 3

**SEPTEMBER 29, 1919** 



Two Ace Biplanes Maneuvring at Central Park, Long Island

Aerial Derby Around the World With Over \$1,000,000 in Prizes Being Organized by Aero Club and Aerial League of America

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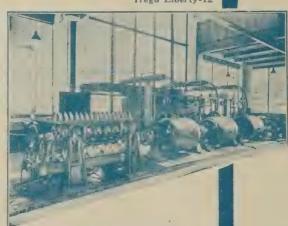
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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., September 29, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, SEPTEMBER 29, 1919

NO. 3

# AERIAL DERBY AROUND THE WORLD WITH OVER \$1,000,000 IN PRIZES BEING ORGANIZED BY AERO CLUB OF AMERICA AND AERIAL LEAGUE OF AMERICA

THE Aero Club of America has announced that plans have been completed for a stupendous International Aerial Derby Around the World, the total prizes of which may amount to over \$1,000,000.

A Special Commission has been appointed and will start next month on a tour around the world to arrange for routes, landing places, referees and organizing committees in every country through which the Derby will pass.

#### Commodore Beaumont Heads Commission Going Around the World

The Special Commission is headed by Commodore Louis D. Beaumont, the millionaire president of the Aviation Officers' Club in Paris and Vice-President of the Aerial League of America, who has just returned from France where he did much invaluable work during the war. Among his many generous benefactions were the establishing of the sumptuous club on the Avenue des Champs Elysees in Paris for the Air Service officers, which became famous as a meeting place of the Allied aviators and high Allied officials; the equipping of a club at Colombe-la-Belle on the American lines for the aviators who were at the front, and the equipping of several other posts and contributing in many ways to supply things needed by American aviators in France.

Commodore Beaumont also subscribed the full sum needed for the monument to Wilbur Wright which is being executed at Le Mans, France, by the famous French artist Paul Landusky, where Wilbur Wright made his first flight in 1908, and which is to be dedicated July 4, 1920.

Commodore Beaumont is well known in business circles throughout the world, having been one of the founders of the May Department Stores Company, of New York, Cleveland, St. Louis and Denver, of which he is vice-president; trustee and vice-president of the Commercial Investment Trust, a private bank; director of the Maloney Electric Company of America; director of the Lighting & Development Co. of St. Louis; operator of public utilities companies; director of the National Hospital for Consumptives in Denver, of which he has been a generous supporter.

The Executive Secretary of the Commission will be Captain Charles J. Glidden, the noted originator of the Glidden Automobile Tours, Vice-President of the Aerial League of America, who recently offered the Glidden Aeroplane Efficiency Trophy.

The third member of the Commission will be Mr. Benjamin Hillman of New York, member of the Aero Club of America and the Aerial League of America, well-known retired business man, and vice-president of the War Savings Stamps Committee of Greater New York.

These three gentlemen are world travelers, having been around the world several times. Captain Glidden was the first man to tour the world by automobile, which he did twice. Commodore Beaumont has traveled extensively through Europe, Africa and Asia.

Will Meet World's Leading Aeronautic Authorities and Scientists

In each country to be visited the Commission will confer with the highest aeronautic and sporting authorities and find out from them the best route to be followed by the competing aircraft and the best aerodromes to stop at.

The rules for the Aerial Derby will be most liberal. The contestants will enter the Derby as individuals, instead of entering the aircraft, and will be permitted to use as many aircraft as they find necessary to complete the tour around the world.

#### Use of Dirigibles Permitted

Dirigibles may be used by competitors for part or all of the trip around the world. This provision is made in the rules because of the importance of the dirigible as a means of transportation over long distances, and the fact that at present only dirigibles are available for the flight across the Pacific, and it is expected that there will be exciting competition between dirigibles and aeroplanes in the flights across the Atlantic.

The rules will permit entries to charter different aircraft for different legs of the journey, and will permit more than one entrant to fly in the same aircraft for part or all of the journey, the belief being that in such a long race the ability on the part of the contestant to charter different aircraft and make close connections from one point to another is a demonstration of efficiency on the part of the competitor, and also contributes towards establishing the principle of air travel by relays, so as to put air travel in the same class with travel by other means.

The contestants will also be allowed to use other means of transportation in making connections between aircraft to the extent of 10 per cent of the total distance to be covered, and will be penalized accordingly for any distance in excess of that percentage which may be traveled by other means of locomotion than aircraft.

Instead of trying to cut the route traveled down as short as possible by touching only the edge of continents, the competitors will pass through the most important cities in each country.

#### Entrants to Decide on Transatlantic and Landscape Routes

The time of the start will be decided after considering the best seasons for each part of the world, so as to strike the average good season for each country.

The entries will decide on the alternative as to whether to cross the Atlantic in flight by way of St. Johns or by way of Greenland and Iceland, which is just as hard.

Also whether to cross the Pacific by flight from Tokyo to Alaska, and from Alaska to Vancouver, Seattle and San Francisco, or whether to fly from Tokyo to Kamchatka, across Behring Strait to Alaska.

# ARMY TO RUN TRANS-CONTINENTAL RACE IN OCTOBER— AERIAL LEAGUE COMMITTEE TO CO-OPERATE

THE plans for a stupendous Trancontinental Aerial Race were announced on September 23 by Major General Charles T. Menoher, Director of the Air Service.

The race is to start on October 8 from both ends of the ontinent. The Aerial League of America has placed at the continent. disposal of the Army its special committee, which has been organizing the Transcontinental Aerial Derby across the continent, to be held next spring, and this committee will both assist the Army in conducting this race and learn from the

In his message, General Menoher prescribed the rules to govern the contest. The impression among officers at the field was that prizes or awards would be given to the winners of the events, but there was nothing in the order to guar-

All Army fliers with planes having speed of not less than 100 miles an hour will be permitted to participate. This will apply to all fliers in the Eastern, Central and Western Army Departments.

The aeroplanes starting from Mineola are to be numbered 1 to 50. Those starting at San Francisco will be numbered 50 to 100. To avoid accidents, night flying will be prohibited. The numerals are to be painted on each side of the fuselage, and upon the under side of one of the wings.

The flights are to be one-way contests, discretion in their machines or by rail. The rules of the race provide for three

First, shortest air-line time across the continent, irrespective of efficiency or time.

Second, actual flying time, as calculated between control stations for each type of machine.

Third, fastest flying time, based on handicaps to be given to each class of machine.

There are to be four races, two east and two west. each way will be governed by control stations, and the others will be direct air-line routes. The control stations announced are: Binghamton, Rochester, Buffalo, Cleveland, Bryan, Ohio, Chicago, Rock Island, Des Moines, Omaha, St. Paul, North Platte, Sidney, Cheyenne, Olcott, Wolcott, Wyo., Green River, Wyo., Salt Lake City, Salduro, Battle Mountain, Reno, and San Francisco.

The stops at these stations must be not less than thirty minutes nor more than forty-eight hours. Stops at the controls are compulsory for all but the air-line pilots. Should contestants be forced to land, or should decide to land for any cause, at places outside of control, the time aground will be counted in their flying record.

#### Aero Club of America Would Offer Liberty Bond Prizes

The Aero Club of America has expressed its readiness to offer large prizes in Liberty Bonds to the winners of the Army Transcontinental Race, and it is hoped that the Government will permit the club to thus reward the aviators who make good records in this event.

### AFRO CLUB HONORS FOREIGN SERVICE COMMITTEE MEMBERS

T a dinner in the clubhouse, the governors and members AT a dinner in the clubhouse, the governors and included of the Aero Club of America extended to Commodore Louis D. Beaumont, Mr. F. S. Lahm and Mr. Sidney B. Veit, members of the Foreign Service Committee of the Aero Club, members on their return to America after Club, a cordial welcome on their return to America after three years of strenuous service in Paris. Mr. Alan R. Hawley was toastmaster and besides the guests of honor there were present: Admiral Bradley A. Fiske, Chas. Jerome Edwards, Alan R. Hawley, Raymond Orteig, Major Howard L. Goodhart, Benjamin Tuska, Harmon August, Admiral Wm. N. Little, Augustus Post, Henry Woodhouse, Lewis H. Nash, S. O. Ochs, J. G. Stuart, George R. Cullman, Herbert A. Gibbons, N. R. Rumpelt, Capt. Hugh L. Willoughby, Arthur Van. S. O. Ochs, J. G. Stuart, George R. Cullman, Herbert A. Gibbons, N. R. Rumpelt, Capt. Hugh L. Willoughby, Arthur Van Siclen, Victor Hugo Barranco, Hugh H. Elsasser, Bernard H. Sandler, George E. Dunscombe, Charles R. Lamb, Grant J. Shipman, Richard Wightman, G. Deuglas Wardrop, Evan J. David, S. Bernheimer, John G. Whytlaw, Commander F. H. Allen, W. L. Lyon, Herbert C. Sampter, Earle Farwell, Benjamin T. Butterworth, Lieut. C. H. Fay, Paul Pryibil, G. H. Stege, Capt. Robt. A. Bartlett, Lieut. Johnson, J. Newton Williams, Malcolm Van Zandt, Earl C. Williams, Dr. J. J. King, Horace Keane, Lieut. J. R. Ferry, Lieut. Wm. Vyse, Thos. H. Crone and A. Tavera.

Mr. Hawley paid a stirring tribute to Mr. Beaumont, as

Mr. Hawley paid a stirring tribute to Mr. Beaumont, as

follows

"In the early days of the war the Board of Governors of the club received a very interesting communication from Paris, suggesting that a Foreign Service Committee be appointed, which should assist in every way possible the effi-ciency and the morale of the officers of the American Air Service, which was just being formed, and help in every way possible to build up the American Air Squadron with the greatest speed possible.

"This Foreign Service Committee was formed by the

emissaries of the club, who were sent over for this purpose, Mr. Evert Jansen Wendell and Mr. Augustus Post, and with the able assistance of the members of the club in Paris, a very strong committee was formed, of which Ambassador Sharp was honorary chairman. During the summer of 1917, the American Air Service built up very rapidly, schools were established and a great number of young men were sent over from America to be trained in France. The activities of the

Foreign Service Committee developed very rapidly and kept pace with the growth of the American Air Service. Foreign Service Committee visited all the fields and camps and training schools and later the squadrons at the front, including the famous Lafayette Escadrille, which was then operating in the vicinity of Soisson; they also distributed literature, magazines and books and clothing for flying and athletic purposes and established a War Medal of Merit and Honor together with a handsome Diploma to be awarded to aviators for signal heroism, bravery and self-sacrifice in face of danger, which is considered to be one of the most artistic decorations awarded.

"The opportunities for service increased and it was necessary to have, beside an office, a home and a building where the officers might be accommodated, welcomed, entertained cheered and inspired to greater achievements, and it seemed an act of Providence that one was added to the Foreign Service Committee who was able, out of the generosity of his heart and his abundant ability and desire to be of service to his fellow men, to provide the most luxurious clubhouse for the Aero Club of America, situated on the handsomest boulevard in the world, the Champs Elysees, and in the most convenient location in all Paris.

"The man who made all this possible and who has done so much for the Aero Club of America and for the officers of the Air Service was born in Dayton, Ohio; he was a boyhood friend of the Wright Brothers, who invented the aeroplane, and he foresaw the tremendous development which we all realize today. He has not only rendered a never-to-be-forgotten service to the living, but he has crystallized our respect, appreciation and immortalized the memory of Wilbur Wright by erecting for him a monument at Le Mans on the historic spot where he first flew in France.

"Mr. Louis D. Beaumont, who has done all this for the Aero Club and the cause of aviation, is about to start on a flight around the world, and he will fly in every country, but before he goes he has honored us with his presence here tonight, and we are all glad to render him the honor which he so richly deserves."

Mr. Hawley also paid a glowing tribute to Mr. Sidney B. Veit for his valuable work in France.



# THE NEWS OF THE WEEK



#### Secretary Baker a Passenger on Lawson Air Liner

Washington, D. C.—Carrying seventeen persons, the Lawson air liner made a short flight from Bolling Field over the city of Washington on September 21. Among the prominent passengers carried were Secretary of War Baker and Mrs. Baker, Senators Johnson of South Dakota, Harding of Ohio, McNary of Oregon, Stanley of Kentucky, Smith of Georgia, Henderson of Nevada and McCumber of North Dakota.

#### Handley-Page Trans-Atlantic Plane to Resume Flight to Atlantic City

Parrsboro, N. S.—The Handley-Page four-engined biplane "America," originally built to bomb Berlin, later brought to Harbor Grace, N. F., for a flight across the Atlantic, has been repaired and is in flying condition. She was wrecked at Parrsboro while en route to Roosevelt Field to meet the R-34 on July 4, owing to a forced descent caused by a broken engine oil feed pipe.

A practically new crew will resume the flight, many of the men having returned to England at the expiration of their leaves granted by the Royal Air Force. A stop is to be made at one of the Long Island fields en route to the Atlantic City

Airport.

#### Lawson's Aerial Pullman Carries Fourteen Passengers From New York to Capitol

Washington, D. C.—With hardly a bump to indicate that he had landed, Alfred W. Lawson, designer and navigator of the giant aerial Pullman, the C-2, brought his ship to a halt in Bolling Field, Washington, at 1 P.M. on September 19, after having transported thirteen passengers besides himself from Mitchel Field, Mineola, in 4 hours and 20 minutes. The passengers were largely composed of newspaper men and aeronautical engineers. Mr. Charles Cox acted as pilot. The others who made the flight were Vincent Buranelli, the chief engineer of the Lawson Airline Company, and his sister, Miss Felicity Buranelli; Fred A. Steele, of the New York Herald, and Mrs. Steele; Evan J. David, managing editor of Flying Magazine; Miss Catherine Brody of the Evening Globe; Richard Wightman, vice-president of the Aerial Touring Association and Mrs. Wightman; Tracy H. Lewis, associate editor of the Morning Telegraph; Frank Schober, of the construction department of the Lawson Company, and two mechanics, A. M. Surini and C. F. Schory.

The party on board had luncheon and walked up and down the "lounging room" of the car just as if they were on shipboard. The Lawson Airliner is so roomy and entirely without obstructions, so that walking up and down the aisle standing fully upright is possible. The large windows, which at the bow of the plane extend from the floor to the ceiling and permit of full clear vision to each passenger, whether standing or seated in any of the comfortable wicker and upholstered chairs. The comfort and height of the Lawson Pullman are considered far superior to any produced in Europe, there being no inside guy wires or braces visible.

On starting from Mineola it was found



W. Wallace Kellett who has arrived in New York to represent the Farman interests in America

that there were but thirteen in the plane. An additional mechanic therefore had the unexpected privilege of being the extra passenger. An altitude of 7,000 feet was maintained throughout most of the flight. The two Liberty engines droned out hour after hour without a miss. The next stage of the aerial tour, which began from Milwaukee, Wis., recently, is

from Washington to Dayton. The present tour is being made to obtain information and experience for the transcontimental service which the Lawson Company will inaugurate next spring between New York and San Francisco via Omaha and Salt Lake City.

#### Schroeder Flies 29,000 Feet Up With Passenger

Dayton, Ohio—Major R. W. Schroeder, flying a La Pere machine, with an observer, several days ago, attained an altitude of 29,000 feet, according to an official annuncement of September 17 from Captain Patterson, of McCook Field, who calibrated the instruments on the craft.

The aviator thus exceeds his own performance, when he lately reached an altitude of 28,250 feet, and once more he breaks the altitude record for two passenger aeroplanes.

Detroit Enacts Aerial Ordinance

Detroit, Mich.—The Detroit City Council passed an ordinance regulating aerial traffic over the city. All aircraft must be licensed and carry identification similar to that carried by motor cars, unless engaged in interstate commerce or on government duty. A license fee, obtainable after satisfactory passage of an examination and payment of ten dollars, is required. Stunt flying over the corporate limits of the city is prohibited. Violators are subject to fine of \$100 or sixty days' imprisonment or both.

# 34,610 Feet New World's Altitude Record Set by Roland Rohlfs

Roosevelt Field, L. I.—In his final attempt to establish a new altitude record, Roland Rohlfs, test pilot for the Curtiss Engineering Corporation, on September 18 broke all existing official and unofficial world's records by climbing to a height of



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Roland Rohlfs, test pilot for the Curtiss Engineering Corporation, just after his world's altitude record flight at Roosevelt Field. In the group are Augustus Post and Sidney Veit, officials of the Aero Club of America, Mrs. Rohlfs, and Colonel Carmody, in command of Roosevelt Field

34,610 feet. The feat was accomplished in an official test made at Roosevelt Field in a Curtiss Wasp, a machine designed and built by the Curtiss Engineering Corporation for the United States Navy last

Although the figures were announced from the barograph reading and will not be officially recognized until the instruments used in the flight have been calibrated by the Bureau of Standards at Washington, D. C., it is expected that there will not be enough variation to affect the feat from being a world's record.

Before the recent flight, Rohlfs held the world's official record of 30,300 feet, but Adjutant Casale, a French pilot, was credited with an unofficial record of 33,137 feet and it was this mark that Rohlfs determined to better.

The fact that the Curtiss K-12, 400-horsepower motor, with which the Wasp was equipped, enabled Rohlfs to get a ceiling of 34,610 feet without the aid of a super-charger is considered by aero-nautical men as being a wonderful demonstration of the ability of the motor.

A day after he had accomplished his feat, Rohlfs established a new climbing record by attaining 19,500 feet in the remarkable time of 9 minutes, 42½ seconds. These two performances already give the Wasp three new world's records, for, at Dayton, Ohio, last year, Rohlfs made a mark of 163 miles per hour with a full military load.

Rohlfs' altitude flight was officially observed by three representatives from the Aero Club of America—Augustus Post, secretary; Sidney B. Veit, honorary secretary of the foreign service committee of the Aero Club, and Prof. C. L. Poore of the department of celestial mechanics at Columbia University. Among those who witnessed the flight were Glenn H. Curtiss, president of the Curtiss company; Col. John D. Carmody, Major Henry J. F. Miller and Major E. B. Lyons, representing the U. S. Army; F. H. Russell, W. W. Mountain, C. M. Keyes, C. M. Manley and J. G. Coffin, all officials of the Curtiss company; G. Douglas Wardrop, managing editor; E.

H. Felix, associate editor, and H. B. Childs, advertising manager of Aerial Age Weekly, and many other aeronautic enthusiasts.

The entire flight took an hour and fifty-three minutes. It required seventy-eight minutes for him to reach his "peak" and thirty-five minutes for him to descend. He had thirty gallons of gasoline in his tank when he went up and a small quantity remained in his tank when he came down. The temperature at his "peak" was 43 degrees below zero.

#### 180 Mile an Hour Trip Between New York and Philadelphia

Philadelphia, Pa.—Piloted by Lieutenant Commander Edwin McDonnell, a Leoning monoplane belonging to the Navy Department covered the distance between New York and Philadelphia in twenty-nine minutes. An effort was being made to lower the New York-Washington record, but the clogging of the gasoline line forced a landing, which was made in what proved to be soft ground, resulting in damage to the machine.

#### Buffalo to New York in Four Hours in Curtiss "Oriole"

Roosevelt Field, L. I.—C. S. Jones, the Curtis's pilot who finished second in the speed contest in the New York-Toronto Aerial Derby, broke the Buffalo-New York speed record by making a non-stop flight on September 19 in 4 hours and 5 minutes. The distance is between 440 and 450 miles. The Oriole is equipped with a 90 horsepower OX-5 engine.

#### Col. Roosevelt Guest of Spokane Fliers

Spokane, Wash.—Lieut.-Col. Theodore Roosevelt was the guest of the Spokane Flyers' Club on his recent visit in connection with the American Legion membership drive. Lieutenant Barnard piloted the distinguished visitor over the city and vicinity.

#### Aerial Transport Enables Doctor to Save Patient's Life

Tulsa, Okla.—Dr. Fred M. Boso, of

© International

The crew of the Lawson Air Liner which has made its first lap of the Trans-Continental journey. Left to right: V. J. Burnelli, chief engineer; A. W. Lawson, designer and pilot; Charles Cox, assistant pilot; A. M. Surini, mechanic; and C. F. Schroy, engine mechanic

Tulsa, had an emergency call at Claremore, twenty-five miles distant. In order to save his patient it was necessary to perform an operation within the shortest possible time, and aerial transport was therefore called upon. A Curtiss Oriole was hired from the Curtiss Southwest Aeroplane Company. Leaving Tulsa at 5 P. M. on September 9th, Dr. Boso performed his operation successfully and arrived home at 7:20 P. M. Upon his return, he immediately placed an order for a Curtiss Oriole.

#### Radio Telephone From Hydroaeroplane to Submerged Submarine

New London, Conn.—A radio experiment made on September 16 off New London in Long Island Sound by the Experiment Station, Naval Station, established communication, both telephonic and telegraphic, between a hydroaeroplane flying 2,000 feet in the air and a submarine submerged several fathoms in the water.

This was a demonstration for the delegates to the annual convention of the Edison Society of Electrical Engineers being held at Eastern Point.

It is said to be the first time that an aeroplane and a submerged submarine have communicated with each other directly, and is considered by naval officers here as an important factor in coast defense and in naval warfare.

#### Aeroplane Takes Off From Sea Sled

Washington, D. C.—The Navy Department conducted a series of successful tests of "taking off" from a sea sled. The plane was lowered from the deck of a battleship onto the sea sled. The sled got under way, gradually gaining full speed. Then the aeroplane engine was tuned up to full speed. The plane rose straight upward as if thrown from a catapult. The test was repeated several times with great success.

#### Jane Herveux Arrives from France to Instruct American Women

New York, N. Y.—Mile. Jane Herveux arrived from France recently for the purpose of teaching American women to fly. Mile. Herveux declared that French women are not eager to learn and that on the other hand American girls are enthusiastic over the new mode of travel. She will establish her school at or near New York.

Mlle. Herveux was the first French-woman to earn a brevet or aviation pilot's' license. This was in 1910. She was a captain of the Forty-seventh French Air Squadron, and was engaged in instruction work throughout the war.

#### Aero Club of Massachusetts Enters St. Louis Balloon Race

Boston, Mass.—The Aero Club of Massachusetts announces that it is entering the balloon America II in the National Balloon Race to be held at St. Louis on October 1. Joseph S. Batt, formerly first lieutenant in the Air Service and commander of the Sixty-eighth Balloon Company, and Joseph Torrey, 2d, formerly dirigible training instructor for the Goodyear Company, will pilot the balloon for the club.

The Aero Club of Massachusetts was organized by ex-service men last May and now consists of four hundred members. Theodore E. Hedlund is president of the



#### Ten-Passenger Martin Army Transport Plane Delivered

Dayton, Ohio.-Flying the 215 miles from Glenn Martin Field, Cleveland, to McCook Field, Dayton, in 110 minutes, the U. S. Martin Army Transport plane, largest and fastest army aerial transport in the world, became Air Service property on September 17. The big twelve-passenger ship was piloted by Eric Springer, chief pilot of the Glenn L. Martin Company, who had as passenger. pany, who had as passengers Tom Car-roll and W. M. Henry of the Martin Company and W. H. Crutchfield, govern-ment representative. Despite the altitude of 9,000 feet which was maintained practically the entire distance because of heavy clouds, and a side wind which made flying by compass rather difficult, an average speed of 117.2 miles per hour was hung up with the motors turning over 1,600 r.p.m. All four who made the trip did so in their ordinary clothes, as the ship is completely enclosed, and the passengers wrote letters, read newspapers, kept a log of the trip and even got

up and walked around inside the fuselage.
The U. S. Martin Army Transport plane is not the Glenn L. Martin commercial plane, but is an adaptation of the well-known U. S. Martin bomber for use in carrying machine gunners to threatened points or for inspection of distant army posts by officers. The only difference be-tween the transport and the bomber is in the fuselage. There are seats for ten persons beside the crew of two. leather seats are placed inside the fuselage, with an aisle between. Large windows of triplex glass give a splendid view. Entrance is gained through a trapdoor in the top of the fuselage. The pilots' compartment, in its customary position, is reached in the same manner and the a cliding does which divides it forms. has a sliding door which divides it from the passenger compartment. Two other passengers are carried in the extreme

nose of the ship and reach their place by means of a trapdoor in the bottom of the fuselage. Because of light weight and splendid streamlining, the ship is faster than the bombers and also has remarkable climbing ability.

#### Farman Company Plans Aggressive Sales Campaign Here

New York, N. Y.—Mr. W. Wallace Kellett has been sent here as representaof Henri and Maurice Farman of Billancourt, France, in order to conduct an aggressive sales campaign in competition with American aircraft manufactur-Offices have been opened at 1 West 34th Street.

The Farman Company will establish hangars on Long Island, where they will assemble and test the planes to be shipped from France. Expert pilots and mechanics will be sent here to conduct the tests and place the machines in perfect operating conditions before delivery to customers. At the field a full supply of spare parts, and sufficient personnel to look after all repair work, will be maintained.

Louis Gaubert, the famous pioneer French pilot, will reach here, with the first French pleasure plane, a three-pas-senger tourabout, within the next few days. Gaubert in 1914 brought down the second Boche of the war and holds the record in France for the number of hours flying and the number of machines tested.

#### N. G. Rost Leaves Duesenberg

New York, N. Y.—N. G. Rost, who has been sales manager of the Duesenberg Motors Corporation since 1916, has resigned his position and has organized a sales company which will represent several automotive manufacturers. Head-quarters will be established in New York City and a branch office at Detroit.

Mr. Rost was very active in the formation of the Duesenberg Motors Corporation and is responsible for the enormous prestige and successful publicity received for Duesenberg engines, despite the fact that the company did not attain large quantity production.

#### Contractor Inspects Work From Aeroplane

Ashtabula, Ohio.—Tom Fitzgerald is the first contractor to inspect a road job by aeroplane. Seated in a Curtiss biplane piloted by Eddy Stinson, Fitzgerald flew to Conneaut and return, a distance of thirty miles, in twenty-five minutes. On thirty miles, in twenty-five minutes. the return trip, he flew 300 feet above the new Ashtabula-Conneaut brick road, the contract for which he is just completing.

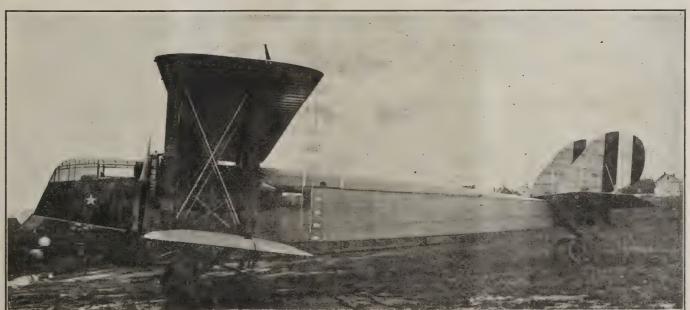
# Curtiss Eastern Aeroplane Company Has Large Sales

Philadelphia, Pa.—The Curtiss Eastern Aeroplane Company of this city has in the few months it has been operating sold seventy-five Curtiss planes, mostly of the army training type. Sales have exceeded deliveries and Mr. Ireland, the general manager, advises that it is almost impossible to get a ride in a plane, for as soon as a plane's assembly is complete, a buyer is waiting to fly away with it.

#### Aerial Activity in Texas

Tulsa, Okla.-Mr. R. W. Hubbard, vice president and general manager of the Inland Refining Company, is the latest purchaser of an aeroplane to visit oil holdings scattered over a large area. first trip was from this city to Jackson, Tenn., a distance of 500 miles, covered in 4 hours and 55 minutes.

A contest is being planned for Thanks-giving Day from Tulsa to Dallas, via Oklahoma City, Lawton, Wichta Falls, Dallas and return Lagar hand Dallas and return. Local chambers of commerce are co-operating and subscriptions for prizes are being raised.



The Glenn L. Martin Army Aerial Transport, equipped with two Liberty engines, and having accommodations for ten passengers



#### Praeger Discusses Expansion of Air Mail Service

New York, N. Y.—Mr. Otto Praeger, Second Assistant Postmaster General, issued a statement regarding the future expansion of the aerial mail service, just before leaving for Havana in order to make arrangements for a Key West-Havana aerial mail line. Several private enterprises operating between these points have made proposals to the Post Office Department and the Cuban Government is very anxious to bring about the inauguration of such a service. In his statement the Second Assistant Postmaster General urged the allowance of a free hand to the Post Office Department for the development of the aerial mail service, without the domination of a militaristic Department of Aeronautics. The development of naval and military aircraft and military aeronautics should be confined strictly to the specialists in those departments.

"The aerial mail is a new development for which the Postmaster General is rightly responsible. I believe it possible under a coordinated system to divide our affairs into two main branches, one of which would be personnel and the other the air mail contractors. It is absolutely necessary for the Post Office Department to operate the aerial mail. There are few landing fields except those we have estab-

lished and there are no laws regulating aerial traffic. After we multiply our fields and lay down flying rules, then it may be advisable to call in flying mail contractors who would operate much as the Star Routes are now run. But these must always be under the control of the Post Office Department. The immediate executive of the aerial mail would find it practicable to co-operate in the development of special equipment with both the aircraft industry direct and with the Director of Aeronautics through his special equipment department.

"There is a great demand for extension of the aerial mail, but we are limited by reason of small appropriations. Petitions are coming in from all parts of the country, principally through local congressmen, asking for the air mail, and even with our limited funds, we will carry the air mail daily to Minneapolis, Omaha and St. Louis in the spring

"The Post Office Department had a bare one hundred thousand dollars to start with and obtained about eight hundred thousand dollars more at the last session of Congress. This sum is being utilized in the operation of about a score of aeroplanes over the Washington, New York and Chicago route. Through cooperation with the army, we have recently obtained one hundred obsolete DeHavilands which, in their present state, are useless either for military or commercial

work. These aeroplanes, equipped with Liberty motors, are being remodeled so as to carry four hundred pounds of mail each. They will provide temporary equipment for such air mail lines as must be established this fall.

"Within the next few weeks, we expect to fly the mail between Cleveland and New York without making an emergency stop at Bellefonte, Pa., as has been the case since last spring. Early this winter we expect to have in the air at least several of the fourteen big cargo machines now under construction in New York, in Cleveland and at Ithaca. The L-W-F cargo mail ship, it is expected, will make nonstop flights between New York and Chicago, carrying three thousand pounds of letter mail in addition to a crew of three men, who will have sleeping quarters aboard. The Glenn L. Martin and Thomas-Morse cargo ships will be slightly smaller, but will be heavily powered and capable of making a New York-Cleveland-Chicago flight with great speed and regularity. With these in operation, the Post Office Department, through its aerial mail, will save one and a half million dollars a year over the present cost of first-class mail transportation. I believe that this record speaks for itself, and entitles the Post Office Department to consideration of its plans for co-ordination in the development of a fixed national aeronautical policy."

### UNITED STATES POST OFFICE

AIR MAIL SERVICE—WESTERN DIVISION

Monthly Report of Operation and Maintenance

JULY, 1919

				Motorcycles, Trucks Rent, Light, Fuel, Power, Telephone and Water Miscellaneous Pilots Pilots Repairs and Accessories Interest on Investment	uel,								SERVICE AND UNIT COST					
Aeroplane No.	Gasoline	Grease and Oil	Office Force		Departmental Overhead Charge	TOTAL	Gallons of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile						
62 63 64 65 66 67 72 73 74 75 76	\$131.85 319.65 223.23 58.32 62.04 27.10 196.80 215.39 299.10	\$27.92 50.45 42.27 8.02 14.79 1.85 28.61 27.49 43.98	\$76.21 76.21 76.21 15.25 76.21 1.84 76.21 76.21 76.21 76.20	\$88.60 88.60 88.60 17.72 88.60 2.10 88.61 88.61 88.61 88.61	\$9.14 9.14 9.14 1.85 9.14 .15 9.13 9.13 9.13	\$75.91 99.91 130.14 9.01 65.62 1.10 110.41 89.81 75.91	\$135.28 217.23 176.48 39.46 8.13 21.14 154.09 124.23 252.68	\$256.51 305.06 331.88 24.04 123.55 4.35 154.56 199.57 262.50 41.98 281.24	\$103.66 81.51 99.26 8.76 977.07 7.85 133.50 165.05 118.36 1.86	\$50.00 50.00 50.00 10.00 50.00 1.00 50.00 50.00 50.00	\$108.63 108.63 108.63 21.75 108.63 2.10 108.63 108.63 108.62	\$1,063.71 1,406.39 1,335.84 214.18 1,583.78 70.58 1,110.56 1,154.12 1,385.11 407.52 1,690.07	445 1,040 735 175 188 95 645 696 990	hr. mi 20 4 33 2 27 0 6 0 1 1 3 1 23 3 19 0 38 5	3 1,950 4 3,325 3 2,576 4 05 1 05 5 185 6 2,266 6 1,831 1 3,461 7 5,525	3.2 3.5 2.3 .6 3.3 3.5 2.6 3.5	\$51.14 42.10 49.23 35.30 1,267.02 21.71 47.26 60.42 35.65	.42 .52 .53 15.08 .22 .49 .63 .40
Total.	\$1.948.70	\$298.21	\$702.97	\$817.27	\$84.22	\$764.85	\$1,503.46	\$1,985.24	\$1.854,44	\$461.00	\$1,001.50	\$11,421.86	6,386	230 5	21,762	3.4	\$49.45	\$.5.

### ALTITUDE LABORATORY FOR THE TESTING OF AERO ENGINES

A Brief Description of the Altitude Laboratory Constructed at the Bureau of Standards for the National Advisory Committee for Aeronautics

#### By H. C. DICKINSON and H. G. BOUTELL

HE Laboratory has been in continuous service for more than a year, except for the occasional delays incident to the usual minor revisions of apparatus and perfecting of means and methods of observation to be expected in any new research work. It may be stated, without reservation, that the laboratory has fully justified the most sanguine expectations as to its practicability and has already yielded results of much importance.

#### Factors in Engine Performance Studied in the Altitude Laboratory

The principal factors in engine performance,—aside from general reliability and useful life, which can be determined only from statistics of performance of a large number of engines,—are as follows

(1) Horsepower and Brake Mean Effective Pressure at full throttle for

a. All air pressures down to the lowest to be encountered in flight.

b. All air temperatures to be expected.

c. All operating speeds.
d. Different grades of fuel.

Various gasoline-air proportions. Various spark settings.

Various jacket water temperatures. g. Various jacket water ten h. Various oil temperatures.

Various back pressures on the exhaust.

(2) Horsepower and Brake Mean Effective Pressure at part throttle, under the same conditions as (1).

(3) Mechanical Losses.

a. Total mechanical losses at operating speeds under any condition mentioned in (1) and (2) with full and part throttle.

b. Elements of mechanical loss, including friction of bearings, friction of piston on cylinder walls, pumping losses, and variation of these losses with oil temperature or viscosity.

(4) Heat Distribution, including the following:

a. Total heat of fuel.
b. Heat equivalent of brake horsepower.

c. Heat loss in jacket.

Heat loss in exhaust.

e. Heat loss in direct radiation.
f. Heat gain in combustion of lubricating oil.
g. Heat lost through mechanical friction.

The dependence of these quantities on:
1. Air density and temperature.

2. Engine speed.
3. Mixture ratio (fuel to air).

4. Atomization of fuel.

Composition of fuel.

6. Throttle opening.

(5) Fuel consumption, depending upon:

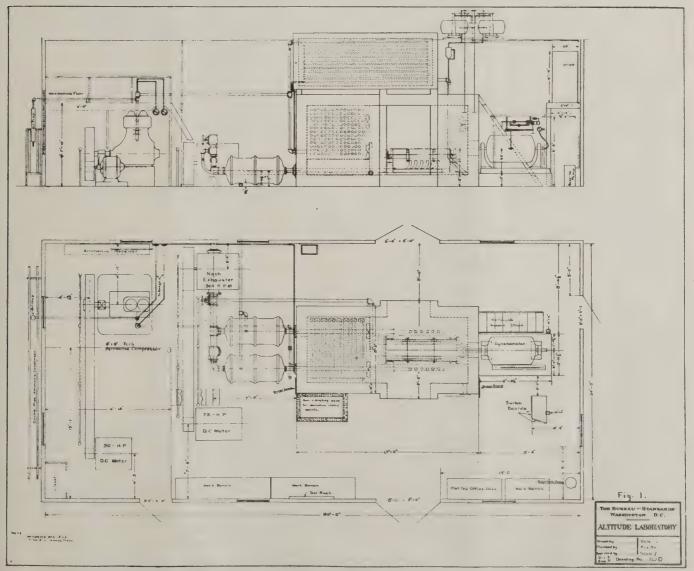


Fig. 1-The Altitude Laboratory at the Bureau of Standards

a. Air density.

b. Air temperature.

Engine speed

d. Throttle opening or power output.

Carburator adjustments for maximum power, or for maximum economy.

f. Miscellaneous operating conditions.

(6) Exhaust Gas Analysis.

a. Quality of exhaust for the different operating conditions listed in (5).

(7) Pressure Distribution in Power Stroke.

- a. As affected by engine operating conditions at various air densities and with fuels of different compositions and with various timings of the ignition.
- (8) Oil Consumption.

(9) Cil Deterioration.(10) Carburetor Performance.

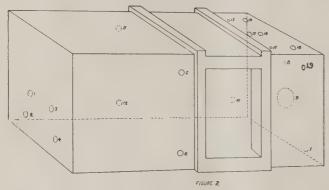
variations in atmospheric a. Compensation for pressure.

b. Compensation for throttle changes.

c. Compensation for varying air temperatures.

d. Idling and acceleration characteristics. Supercharging devices as applied to engines

(12) Low air pressures and temperatures as affecting general performance of engines and miscellaneous accessories.



The Altitude Laboratory has been designed and equipped to supply data concerning most of the foregoing factors.

#### Provisions for Controlling Operating Divisions

The conditions of air pressure and temperature, as well as The conditions of air pressure and temperature, as well as himidity if necessary, can be varied and controlled at will to simulate conditions at altitudes as high as 30,000 feet; the pressure being independently controlled at the intake and exhaust of the engine, as well as in the test chamber.

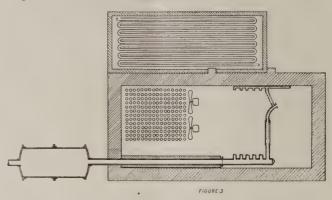
Temperature of the jacket water is controlled either automatically or by hand; and oil temperatures can be regulated by means of special arrangements adapted to the particular engine under test.

engine under test.

Engine speed and load are controlled by means of an electric dynamometer, combined with a water brake, to care for excess load. Mixture ratio, spark setting, etc., are adjusted in the appeal of the property of the in the usual manner from outside the chamber.

#### Provisions for Measurement

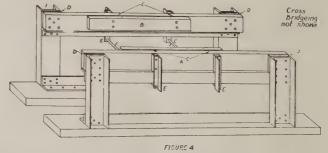
Torque and speed are measured by direct methods, while fuel consumption is determined by direct weighing, with a rate of flow meter for convenience. Separate weighing tanks are provided in order to compare different fuels.



Rates of water flow are measured at the following points by means of calibrated venturi meters:

a. In the water jacket line, measuring water circulation through the cylinder jackets.
b. In the lire supplying cooling water to the exhaust, permitting n easurement of the heat in the exhaust.

c. In the line supplying cooling water to the oil cooler, permitting measurement of the heat in the oil.



Rate of air flow to the carburetor is measured by means of a large venturi tube, which has been compared with a Thomas meter, the latter also having been used for metering the intake air. Where the carburator design permits of it, meas-

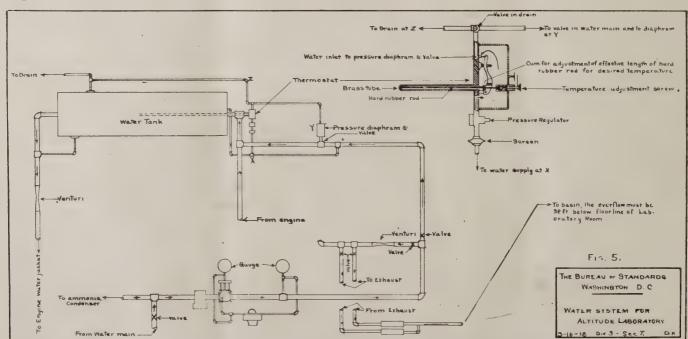


Fig. 5. Layout of the water system at the Altitude Laboratory at the Bureau of Standards

urements of air flow can be made by previous calibration of the carbureter choke in the carbureter test plant at different air densities. This is a newly developed method which offers promise of excellent results.

The rate of oil flow is to be measured in special cases by

oil venturis, but these have not yet been completed.

Pressure measurements are made at numerous points, depending upon the special problem in hand. For this purpose, there are provided an adequate number of copper tube connections running from the chamber to a gauge board on the outside, which is fitted with glass "U" tubes for use with

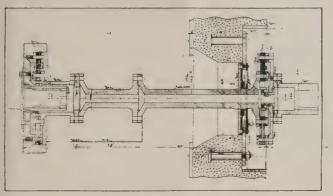


Figure 6

mercury or water as may be required. This gauge board is

described in detail in a subsequent paragraph.

Measurements of maximum compression pressure and maximum explosive pressure are made by two different types of pressure indicators, which give very satisfactory check results. No satisfactory measurements of cylinder pressures, other than maximum pressures have yet been made. Much time has been devoted to the perfecting of a satisfactory pressure indicator. This device has now reached the stage of trial observations and promises good results. None of the several pressure indicators on the market can be readily adapted to use on an engine in a closed test chamber, where the indicator cannot be reached by the operator. The design under construction is adapted to this condition.

Temperature measurements are all made by means of calibrated thermo-electric couples, which in the hands of a skillful observer can be relied upon to an accuracy of 0.1 degree F.,

or much better than this if occasion requires.

Exhaust gas samples can be withdrawn from any one of the cylinders of a twelve-cylinder engine by means of copper tubes connected to the independent exhaust manifold of each cylinder. Comparatively few exhaust gas analyses have been made up to the present time. Apparatus has been perfected and is under construction which will permit of continuous indication of all the important constituents of the exhaust gases, but the apparatus is not yet complete.

#### General Description of the Altitude Laboratory

Briefly, the laboratory consists of a concrete chamber, within which the engine is mounted, and from which the air may be exhausted to any pressure as low as one-third of an atmosphere, by means of a Nash centrifugal exhauster. At the same time the air is cooled to a temperature corresponding as nearly as possible to that encountered at the altitude of the test, by passing it over refrigerating coils. In the interior of the chamber electrically driven fans are mounted which circulate the air over the coils and about the engine. As before mentioned, the power of the engine is absorbed and measured by an electric dynamometer and a water brake mounted outside the chamber and connected to the engine through a flexible coupling. The general arrangement of the laboratory is shown in Fig. 1.

It will thus be seen that the conditions encountered in actual flight can be closely duplicated, while at the same time all the necessary data can be taken and easily recorded under the (Continued on page 97)

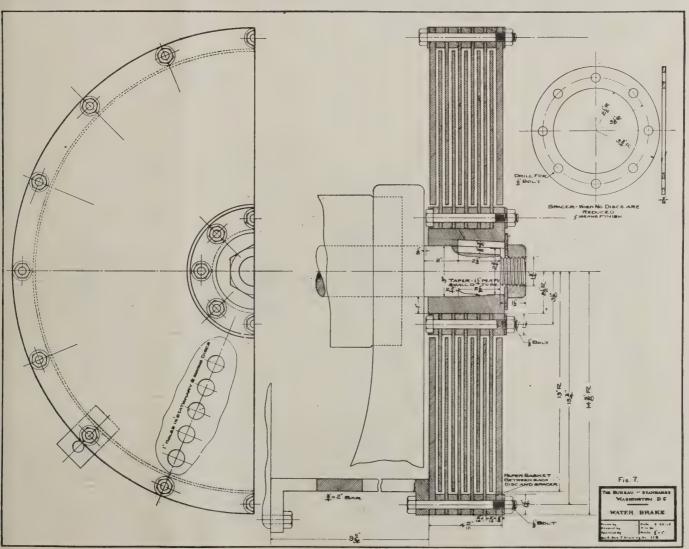


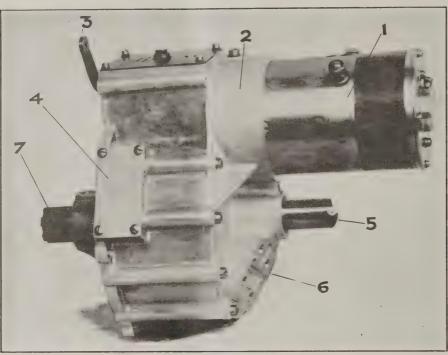
Figure 7. The Water Brake which increases the capacity of the dynamometer by 400 horsepower

#### 88

# THE LIBERTY STARTER

T has been demonstrated that a motor starter is essential on a military aeroplane for the safety of its occupants and the reliability of its operations. The same considerations apply to the commercial aeroplane of the future.

to a cord, etc., in the reach of the aviator for operating the electrical starting means. Figure 4 is a plate which can be detached for mounting accessories to be driven by the crankshaft of the engine, electric generator, machine gun synchronizer, etc.



Photograph A shows the Liberty Starter assembled and ready for attachment to Liberty Motor

Therefore when there was submitted to the Bureau of Steam Engineering of the Navy Department a starter which met all requirements and satisfactorily passed series of tests, orders were immediately placed for this starter, known as the Liberty Starter.

The design of this device possesses several features in construction and design which are of interest from an engineering standpoint. A single compact unit en-closes both hand and electric starting, thus providing for any failure of the storage battery.

The unit is aligned directly with the crankshaft, thus relieving the shaft and main bearings of any strain. In effect, it is part of the crank-case.

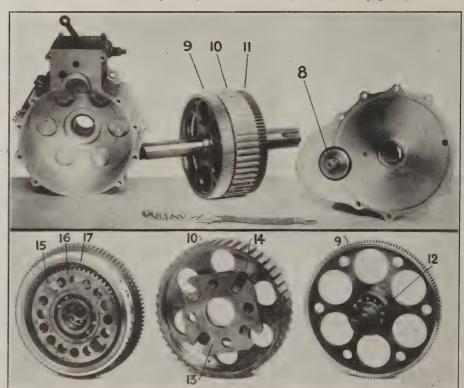
The starting unit is mounted on the ranking end of the motor, opposite the propeller. This does away with head resistance and eliminates the necessity for freakishly designed radiators. Being a single unit, and completely housed in metal, it is water and oil proof. Its weight, however, is about one-third less than any separate hand and electric starter not com-

Photograph A shows the devices completely assembled and ready for attachment to a Liberty motor. (1) Being the electric motor which is used for electrical cranking and figure 5 being where the hand-crank can be attached to crank the engine through a portion of the reduction, thus enabling the aviator, in case of fail-ure to his electrical equipment through accident or otherwise, to crank the engine by means of a small hand-crank without touching the propeller. Figure 2 is the casing which encloses the gear reduction, it being made oil and water tight, the gears revolving in a bath of oil at all times. Figure 3 is a switch-handle which connects

Shaft 7 connects directly with the crankshaft being keyed to it by means of external splines. Pads are provided on figure 6 for bevel gear mounting if the hand-crank is to be mounted at right angles to the crank-shaft.
Photograph B shows a partially dis-

sembled view of the interior (fig. 8), showing the motor pinion which meshes with gear 9, Figure 10 is a one-way rachet gear which is held when starting by pawls (not shown) when the starting switch is operated. Figure 11 is a gear which corresponds with opening in the crankcase for driving before mentioned accessories. A further dissembled view of the interior gear reduction is shown on photograph C, one reduction being accomplished through an eccentric 12 which is fastened to the hand-cranking shaft and to which gear 9 is mounted. This eccentric engages an inner race of a bearing mounted in an external gear (fig. 15). This gear being revolvably and eccentrically mounted in an internal gear (fig. 17), there being only a few teeth difference between the two gears. A universal plate (fig. 13) engages with studs (fig. 15) upon the external gear and also interlocks upon studs (fig. 14) in rachet gear (fig. 10), this plate allowing a universal movement of the erternal gear (fig. 15), within the internal gear (fig. 16). But while in cranking, if figure 10 is locked by reason of the pawls in conjunction with the starting switch, the rotating of the eccentric gear causes internal gear (fig. 17), to revolve, thus cranking the engine. When the engine rotates under its own power, the ratchet teeth of gear 10 over-ratchet, and when the aviator releases the starting switch the pawls are lifted out of engagement and the unit revolves as a small fly wheel. It does not drive gear (fig. 9), so the electric motor need not be disengaged. The electric motor connects gears at a ratio of 12 to 1 to the eccentric, the eccentric and internal and external combination being worked out at a ratio of 21 to 1, so if hand power alone is employed with crank the ratio will be 21 to 1. The electric power cranking at  $12 \times 21$ , or 250 to 1.

In the gear reduction, ball bearings are (Continued on page 98)



Photograph B. Partially assembled interior. Photograph C. The reduction gear

# THE SOPWITH AEROPLANES

(Concluded from page 17)

#### The Sopwith "Snipe"

HIS machine, brought out March 17, 1917, was produced primarily with a view to the attainment of a very high performance and exhibits characteristic of both the "Camel" and "Dolphin." From the latter it differs in point of stagger and plane dimensions, and also in having a 200 h.p. B. R. engine in place of the Hispano-Suiza. As in the "Dolphin," the rudder is of large size and balanced, and the "Snipe," as might be expected from its general lines and arrangement of weights, was highly manœuvrable. The piolot's head, owing to the deep fuselage and small gap, is on a level with the top plane, the centre of which is partly cut away and partly slotted. A double-bay system of struts is used, giving, with the relatively small span, great constructional strength. Owing to the large diameter of the B. R. 2, the rectangularity of the fuselage only appears towards the tail,

and the body is more pronouncedly circular than in previous Sopwith designs. The "Snipe" did not make its appearance until well on in the middle of 1918, and had thus very little chance of introducing its qualities to the German Flying Corps. In the short time at its disposal, however, it made an enviable reputation for itself. In four days a single "Snipe" squadron accounted for 36 enemy aeroplanes, and downed 13 in one day. At this rate German aerial personnel would have become rapidly exhausted. An outstanding feat was that performed by Major Barker, who, on a Sopwith "Snipe," when attacked by 60 hostile machines, crashed four of them and drove down no less than 10 out of control.

In addition it might be mentioned that a "Snipe" fitted with an A.B.C. engine attained a speed of 156 m.p.h. and climbed to 10,000 ft. in  $4\frac{1}{2}$  minutes.

#### The Sopwith "Dolphin"

Two principal objects were borne in

mind in the design of this single-seater fighter-firstly, to make good use of the 200 h.p. Hispano-Suiza engine (which had reached a productive stage), and, secondly, to afford the pilot a range of vision greater than that of any other existing aeroplane. The former necessitated a departure from the usual lines of the Sopwith fuselage, the upper surface of which in the rear of the cockpit is more pronouncedly arched than in previous types. The span of the planes was increased beyond that of the "Camel," and a doublebay arrangement of struts adopted in order to provide great structural strength. At the same time the gap was slightly diminished, and, what forms a srong characteristic of the type, a negative stagger was adopted, with the object of placing the main spar extensions of the top plane in such a position as not to interfere with the complete freedom of movement of the pilot, who occupies the rectangular space formed by them. On these tubular steel spar extensions—which are supported

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	0.3.		ing an.		ing ord.	w	ing are	a.*	In	ci- ice		jr.	back.	Dibe	edral	ਫ		Area			Area.	
Type of machine.	Length	Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top.	Bot.	Gap,	Stagger.	Sweepback.	Top.	Bót.	Aileron	Tail- plane.	Ele-	Total.	Fin.	Rudder.	Total.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	sq	uare fe	et.	0	. 0	ft, in.	ft. in.	0	0	0	sq.ft,		uare fo	eet.		iare fe	
ristrutter Pup Triplanet Camel Snipe	32 6 28 10 25 4 19 4 18 10 18 9 19 10	25 6 50 0 25 8 33 6 26 6 26 6 28 0 31 1	25 6 50 0 25 8 33 6 26 6 26 6 28 0 30 0	5 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5 11 5 2 5 6 5 11 3 3 4 6 5 0	128 183 132 84 125 138	112 170 . 122 75 115 133	474 240 353 254 231 240 271	3.0 2.45 1.5 2.0 2.0	2.45 1.5 2.0 2.0 1.8	4 5 3 9 4 3	0 11 1 0 0 8 2 0 1 6 1 6 1 4	0 0 0 0 0	3.5 2.0 2.45 3.0 2.5 0.0 4.0	3·0 2·5 5·0 4·0	60	14.0 35.5 23.0 14.0 14.0	28.0 21.5 11.8 9.6 10.5 11.0	26 57 34·8 23·6 24·5 26:0	8·75 2·7 3·5 3·5 2·5 3·0 2·75	6:5 7:25 4:5 4:5 4:9 9:0	6·07 21·75 9·2 10·75 8·0 6·5 7·9 11·75
Cuckoo	22 3 28 6 23 3 <sup>1</sup> / <sub>2</sub> 19 6	32 6 46 9 34 6 31 2	32 6 46 9 34 6 30 1 <sup>1</sup> / <sub>2</sub>	4 6 6 9 5 6 5 0	4 6 6 9 5 6 5 0	132 290 162 139	131·25 276 164 133	263·25 566 326 272	3.0 1.8 1.8	2.0 3.0 1.8 1.8	4 3 6 0 4 6 4 3	-I 0 0 0 I 9 I 5	0	2.5	2·5 2·5 4·0	80	35.6	18.0	30·5 53·6 38·8 26·0	5.7	8.0 9.0 9.0	11.5 13.7 13.0

Table of weights.	etc. and	performance of	Sopwith machines
TADIC OF MCIKITO	cic., and	Deliginance of	SODWILL HIACHINES

The state of the s	Type of machine.  Type. H.P.		Meight of machine.  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)  (loaded)		el :	city.		Speed (m.p.h.)			Climb (in mins.) to			ing.	sq. ft.	/h.p.	ary d.
machine.					Range (in miles).	6,500	10,000	15,000	6,500	10,000	15,000	T. Ceiling.	Landing r speed.	sd Load/sq.	1000	sql Military load.	
Tabloid	S. C.	80 150 100	730	1,120	-245		92†	100			*0 0		*6 000	36 40 45		14.0	*60
1½ Strutter	C.	130	1,316	2,205	404 502		102	98.5			18.9 24 6		16,000		6.7	17.5	160 344
Pup		· 80	787	1,225	178	320	106.5	104.5	94	8.0	14.4	30.1	17,500		4.8	14.6	80"
Pup		100	856	1,297	181	190	107	104	100	7.1	12:4	23-4	18,500	30	5.2	12.4	80
Triplane		130	1,103	1,543	180		112.5	106.5	95	6.5			20,500			12.4	80
Camel ~		110	889	1,422	252			118.5		5.2			24,000		6.2		TOI
Camel		150	.993	1,523		275		117.5					23,700			10.15	
Camel		T30	929	1,453	243				106.5				19,000		6.3		IOI
Camel		100	882	1,387	224	300	1 .	106	100		11.8	23.2		35	6.0	0	101
Camel	A.R.1	150	977	1,508	250		116.5		103	5.5			18,000		6.5	10,0	IQI
Camel		150		1,470		310	1	121	114.5				23,000				
Camel		150	1,036	1,530	223			118	113		11.5	25 0	18,000	38		10.2	91
Snipe		230	1,310	2,020	343			I2I	113				20,500		7,5	8.86	
Dolphin		200	1,406	1,881	194		131,5	128.5			8.25	14.7	23,500	40	7.3		IOI
Dolphin	-TT C	300	1,566	2,358	504				133‡	5.2	8.3	12.2	24,600	40	9.0		107
Cuckoo Buffalo	B.R.2	200	1,840	3,370	.00	420	9	100	1	14.5	20.0		19,000			17.0	
01 1	DD	230	2,230	3,100	380		100§			4.9			-	60		13.5	
Salamander .	D.R.2	230	1,844		258			117		-	17.1		14,000		9.4		410

G= Gnome. G.M. = Gnome monosoupape. H.S.=Hispano Suiza. \* At full speed. & At 5.000 ft. S= Sunbeam. Le Rh. = Le Rhone. C = Clerget.

† At ground level.

† At 16,400 ft.

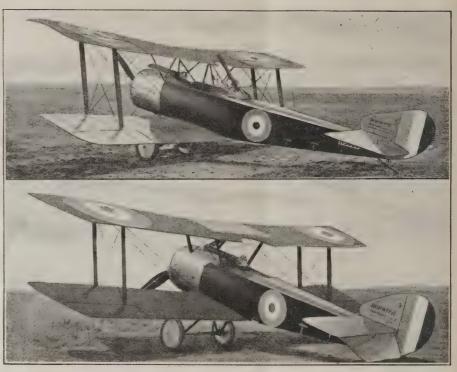
| To 3,000 ft.

by four short vertical struts from the fuselage-are mounted two Lewis guns, capable of being aimed independently of the direction of the machine. Two fixed Vickers' guns firing through the propeller are arranged along the top of the engine, and are partially covered in by this cylinder fairing. The general arrangement of the front part of the fuselage is particularly neat, and its formidable appearance is well supported by the "Dolphin's" offensive capabilities. The radiator is divided into two portions, each carried on one side of the fuselage level with the pilot's cockpit. In front of each radiator is arranged an inclined and adjustable deflector, allowing the whole or any part of the cooling surface to be obstructed. Among other features of the "Dolphin" will be noted an empennage design differing markedly from that of previous Sopwith types. The fin is of a more upright shape and the rudder is balanced.

#### The 300 h.p. "Dolphin"

In connection with this type it is of considerable interest to note that at the signing of the Armistice it was being built in quantities by the French Government, for themselves and the American Government in France. It is fitted with the 300 h.p. Hispano-Suiza, and an adjustable tail plane is employed, since the variable load is considerable, the French and American Governments calling for a very large quantity of petrol to be carried. The machine was reinforced in certain respects to allow for the considerable addition of power, and it had every promise of being an extremely formidable proposition.

In general outline it was very similar to the 200 h.p. Hispano-Suiza "Dolphin." The guns were completely concealed under the cowling, being fitted in tunnels, and the air intake of the carburetor was fitted with a telescopic-type gas tube direct into the front cowl, considerably diminishing the risk of carburetor fire.



Above—The 130 H.P. Sopwith 1½ Strutter Fighter (two seater) Below—The Sopwith Pup, with a Gnome 100 H.P. engine

#### The Sopwith "Cuckoo"

There is a genuine humor in all the Sopwith type-names, and in none more so than in the "Cuckoo," which was encouraged to lay a very splendid egg in any German nest that could be located above the surface of the sea. The egg in this case was a special 18-in. torpedo, which the "Cuckoo" carried strung underneath her fuselage and between the wheels of the landing carriage, which, it will be observed, consists of two independent wheels, each separately mounted, and not, as is usual, united by a common or articulated axle.

This machine was built at the request

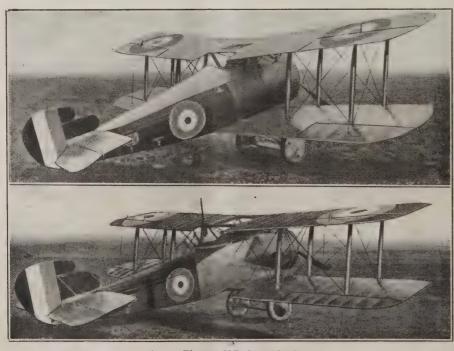
of Commander Murray Sueter, R.N., and was of considerable dimensions. The treble-bay arrangement of struts will be noted, as also the installation of the 200 h.p. Hispano-Suiza geared engine, with the elliptical radiator surrounding the propeller shaft.

#### The "Buffalo"

This machine, fitted with a B. R. 200 h.p. engine, was designed primarily for reconnaissance and contact patrol work, with a view to armouring the pilot, observer and fuel tanks against enemy attack. The construction of the fore part of the fuselage was similar to the "Salamander." It was fitted with one synchronized gun firing forward and one Lewis gun on a Scarfe ring mounting firing aft. The experiments with this machine were highly successful, and it was on the point of being put into quantity production when the Armistice was signed.

#### The "Salamander"

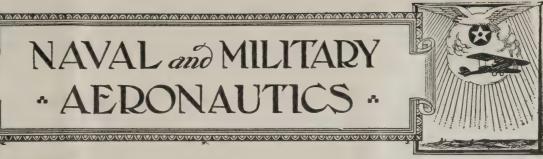
In general lines this formidable aeroplane is modelled upon its prototype, the "Snipe," but its function is of a totally different character, as it was designed primarily as a trench fighter, for which purpose it is armed with two fixed machine guns and protected with armor plating. The latter forms the front of the fuselage from a point immediately in the rear of the engine (a B. R. of 200 h.p.), and extends to the rear of the pilot's cockpit. This plating was not added to an existing frame, but had a structural as well as a protective function, and itself formed the front portion of the fuselage. It will be noticed that the faired cowling behind the engine is added above the armor. A small variation from "Snipe" detail is seen in the tapering spine serving to fair off the pilot's head. The being bullet-proof, gave him a considerable means of protection against attack from the rear. The total weight of the armor is 650 lbs., and, in addition to this extra load, 2,000 rounds of ammunition were carried for the guns.



Above—The 230 H.P. Sopwith "Snipe"
Below—The Sopwith "Buffalo", with a 230 H.P. B.R. 2 engine



# NAVAL and MILITARY AERONAUTICS



#### to Provide for 1,200 Air Service Officers

Washington, D. C .- The committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2622) to pro-vide the necessary commissioned person-nel for the Army until June 30, 1920, has offered the following substitute for the

proposal offered by the House:

"That until June 30, 1920, the Secretary of War is authorized and directed maintain such commissioned personnel in addition to the officers of the permanent establishment and to retain at their temporary grades such officers of the Regular Army as in his judgment may be necessary for the proper performance of the functions of the military establishment: Provided, That additional officers so maintained be selected, so far as practicable, from officers and enlisted men who served during the emergency and are applicants for appointments in the permanent establishment; Provided further, That after October 31, 1919, the total number of commissioned officers, exclusive of retired officers and disabled emergency officers awaiting discharge upon completion of treatment of physical re-construction, shall at no time exceed 18,-000; Provided further, That no officer on the active list shall be detailed for re-cruiting service or for duty at schools and colleges, not including schools of the and colleges, not including schools of the service where officers on the retired list can be secured who are competent for such duty; And further provided, That hereafter officers retired for physical disability shall not form part of the limited retired list; And provided further, That 1200 emergency officers shall be assigned to the Air Service, of whom not less than 85 per cent shall be duly qualified fliers.

# Army Air Service Being Concentrated at Two Points

Washington, D. C .- According to transfers made in recently issued orders, the Air Service is being virtually concentrated at two points, one on the Mexican border and the other at Langley Field, Virginia, on the Atlantic Coast. All squadrons and separate units engaged in border patrol are to be based on Kelly Field, while Langley will be the head-quarters of the Atlantic seaboard units.

#### French Built Dirigible to Be Stationed at Langley Field

Langley Field, Va.—Progress in dirigible instruction at Langley Field has been very advanced during the past two or three weeks. At the present time there is but one airship there, and this of the smaller type. However, it is expected that within a very short time, at least two or three more ships will be sent to Langley Field, and it is hoped that one of the latter will be the latest French designed dirigible, built by the Zodiac Company for the American Navy during the war. This ship has a volume of 219,000 cubic feet, has a length of 236 feet, width of 49.2 feet and heighth of 65.5 feet. It was orig-inally fitted up with a 75 millimeter gun, but it is very probable that this gun will

be removed before the ship is delivered to the Army. However, the installation of the ship is of the latest design and it will provide accommodations for ten or twelve passengers. The nacelle or cabin is most luxuriously fitted and will give an idea of the possibilities in future airship

cabin design.

It is believed that the French ship will be of sufficient volume to carry on a very efficient instruction in the advanced work required of an applicant for the rating of dirigible pilot before such applicant can fully qualify. The larger ships, such as fully qualify. The larger ships, such as this French ship, require at least three officers for its proper navigation. One of these officers has charge of the change in the altitude of the ship, maintaining necessary pressure in the gasbag, ballonets, etc., and in general making the necessary corrections to restore equilibrium when this is necessary. Another officer has charge of the direction of the ship and must keep it at all times on its proper course. The third officer or commanding officer, is in general charge of the direction of the ship and of all members of the crew. The advanced courses of instruction, therefore, for a dirigible pilot; would qualify him to assume the duties of commanding officer of the ship as well as those of either of the other officers.

In addition to the French ship, it is contemplated sending one or more of the type ships, now used by the Ameri-Navy in home waters. This ship is can Navy in home waters. an American development and has been constructed in the past by the Goodyear Tire & Rubber Co. It has a volume of

175,000 cubic feet.

A hangar is now being constructed at Langley Field which will be of sufficient two or more "C" type ships, in addition to the small ship which is now there. It is believed that this hangar will be completed about October 1st, and arrangements are being made if possible to deliver the dirigibles on or about that date. About the 15th of October, therefore, it is hoped that full instruction on all matetrs connected with the care, operation and maintenance of dirigibles can be given at Langley Field. It is also hoped that with the larger ships such as the French Zodiac, it will be possible to take extended flights and in many cases, it is believed that these flights will be from Langley Field to Washington and nearby stations.

#### Air Service Demobilization Still Continues

Washington, D. C.—A statement by the Statistics Branch of the General Staff giving figures inclusive of all decreases up to August 21, shows that 92 per cent of the Air Service personnel on duty on November 11 has been discharged. These figures do not include 264 officers and 183 enlisted men in transit or at demobilization camps awaiting discharge.

Per Cent Net Nov. 11 Aug. 21 Decrease Cadets ..... 6,483 Enlisted men. 167,986 999 12,703 92 Officers ..... 20,554 3,169 85

15,875

92

#### Bill to Train Officers in Aeronautical Engineering Being Considered

195,023

Washington, D. C .- The Senate Committee on Military Affairs has reported the bill (S. 2733) to provide for the training of officers of the Army in aeronautic engineering and the issue of equipment and materials therefore as in Committee of the Whole.

The bill permits the Secretary of War to detail such officers of the Army as he may select, not exceeding twenty-five at any one time, to attend and pursue courses of aeronautic engineering or associate study at such schools, colleges and universities as he may select. The Secretary is authorized to pay the tuition for the officers so detailed and to provide them with necessary textbooks and technical supplies from any moneys available for the Air Service not otherwise spe-cifically appropriated. The bill has passed third reading.



C Ledger Photo Service



#### FOREIGN **NEWS**



#### Gosport Flying Boat Weathers 72 Mile Gale

Gosport Flying Boat Weathers 72 Mile Gale

London—On the afternoon of August 28 the F 5 (Porte) flying boat, fitted with two 350 h.p. Rolls-Royce engines, which, by permission of the Air Ministry has been exhibited by the Gosport Aircraft Co. at Amsterdam, flew back to England in the gale, which did so much damage in the Channel and North Sea. Lieut-Col. R. Hope-Vere, A. F. C., was the pilot and there were four other persons on board, including Mr. M. H. Volk, general manager of the Gosport Aircraft Co.; in addition, about 400 lbs. of luggage was carried. The journey occupied just under three hours.

An indication of the weather conditions is the fact that although the air speed was 72 knots, the machine, when turned into the wind, was nearly brought up standing and, further, the boat had to be steered at an average of 35 points south of the true course.

A perfect landing was made at Felixstowe, but the sea was so rough that it was necessary to cruise around for an hour and-a-half before a motor boat could get alongside to take the party off.

#### Spares for D'Annunzio's Rome-Tokio Flight Shipped

Rome—Preparations for Gabriele d'Annunzio's Rome—Tokio—Rome flight are proceeding rapidly. The steamship Nippon left Italy for Tokio carrying spare parts for aeroplanes and aeronautical instruments which will be unloaded at various points along the route which has been selected.

D'Annunzio will pilot an S. V. A. biplane, accompanied by pilots Ancilotto Locatelli Ferraria and Biliane.

D'Annunzio will pilot an S. V. A. biplane, accompanied by pilots Ancilotto, Locatelli, Ferrarin and Bilisco.

#### Spanish Aviators Attack Raisuli

Tangiers—Spanish airmen conducted a bombing raid against the stronghold of Raisuli at Wadi Ras. Two of Raisuli's troops were killed on the first raid, which occurred on August 23. There were no casualties on the second raid on the following day, for dugouts had been prepared some time ago on Raisuli's orders, to which the bandits had retreated. Efforts were made to shoot down the plane, which is described by reports as being armored. Sixteen bombs were dropped in the raids. It will be remembered that this bandit captured two Americans during Roosevelt's administration but were given up by the bandit without ransom in response to a brief cable from Roosevelt.

#### International Air Traffic Association Formed at The Hague

The Hague—An international conference of aerial traffic companies has been held at The Hague at which it was decided to institute a combination of interests under the title of "The International Air Traffic Association."

# Handley Page Secures Official Concession for Buenos Aires-Pernambuco Service

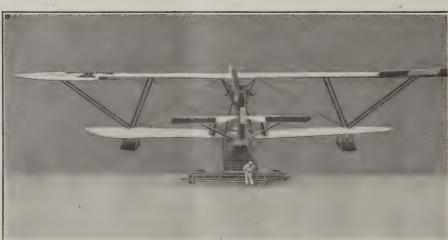
London—The Handley Page Company is reported to have secured an official concession from the Brazilian Government for the establishment of a passenger and mail service between Pernambuco and Buenos Aires, a distance of 2,725 miles. At first the flying will be by day only and the trip is to consume four days. A night service is to be inaugurated later.

#### Flying Boat Demonstration Tour Over Scandinavian Countries

London—As a stimulation four Over Scandinavian Countries
London—As a stimulation for the British aircraft industry, the Air
Ministry conducted a flying tour over the Scandinavian countries.
An F 5 flying boat, N 4044, using Rolls-Royce engines of the Eagle
VIII type was used. The flight, covering a distance of 2,450 sea miles
in 40 hours, 40 minutes, demonstrated the feasibility of flying boat
commercial services for Norway, Denmark and Sweden. The summary
of the trip is as follows:

	· Sea	Hours
*	miles	Flying
Felixstowe to Dundee, July 11	360	60
Dundee to Christiansand, July 20	380	7—15
Christiansand to Christiania, July 22	150	220
Christiania to Copenhagen, July 29	265	4-15
Copenhagen to Stockholm, August 3	390	4-30
Stockholm to Goteborg, August 4		5-0
Goteborg to Esbjerg, August 5	245	4-25
Esbjerg to Felixstowe, August 6		655
	2.450	4040

In addition, demonstration flights, aggregating five and one-half hours,



Rear view of an Austrian Loehner flying boat

#### Aero Club De Cataluna to Hold Aviation Meet

Barcelona, Spain.—An aviation meet will be held at Barcelona under the auspices of the Aero Club de Cataluna on October 5. The chief event will be a race over a course of 100 kilometers. The competitions are for Spanish pilots and Spanish planes, but if more than three foreign entries are received, a special prize will be reserved for them.

#### Royal Air Force Decorations Approved

Royal Air Force Decorations Approved

London—The following ribbons, as described below have been approved and are officially substituted for the previously issued insignia: Distinguished Flying Cross—One inch and a quarter in width; violet and white alternate diagonal stripes, each of one-eighth of an inch in width, running at an angle of 45 degrees.

Air Force Cross—One inch and a quarter in width; red and white alternate diagonal stripes, each of one-eighth of an inch in width running at an angle of 45 degrees.

Distinguished Flying Medal—The same as that for the D. F. C. except that the diagonal stripes are one-sixteenth of an inch in width. Air Force Medal—The same as that for the A. F. C. except that the diagonal stripes are one-sixteenth of an inch in width. The ribbons will be worn one half-inch in depth, the diagonal stripes running downwards from the centre of the tunic towards the left, and will be so arranged that:

(1) Distinguished Flying Cross or Air Cross Ribbon will show at the top corner nearest to the left arm, and at the bottom corner nearest to the centre of the tunic triangles of equal dimensions of violet or red, as the case may be.

(2) Distinguished Flying Medal and the Air Force Medal ribbon will show at the bottom corner nearest to the left arm a triangle of white and at the bottom corner nearest to the left arm a triangle of white and at the bottom corner nearest to the centre of the tunic a triangle of equal dimensions of violet or red, as the case may be.

(3) The order of precedence will be the same as at present.

The new ribbons should be worn as soon as practicable by all officers and airmen awarded these decorations. The ribbons are now available, and a free issue will be made to those awarded these decoration for the ribbon should be made to:

(1) Officers—The Secretary, Air Ministry, Kingsway, W. C. 2.

(2) Airmen—The Officer i/c Records, Royal Air Force, Blandford, Dorset.

#### Air Force Veterans Organize in British Columbia

Vancouver, B. C.—The returned flying men from the Royal Air Force have formed themselves into a League. These men comprise fighters from every theatre of war, who have had abundant experience. Funds were raised by subscriptions, memberships and donations, and Curtiss JN-4 machines have been purchased. Considerable flying has been done and the machines have made several records. It is a quite frequent occurrence to fly between Victoria and Vancouver, and Victoria and Seattle (Washington), not to mention several other smaller places in the vicinity.

On July 11th the Victoria plane "Pathfinder" created a sensation by using the main street of Port Angeles (Washington) as an aerodrome and several of the leading men there were taken for flights.

The League is formed under the Benevolent Societies Act and the following policy was adopted.

1. To procure aeroplanes of the latest type, to keep such flying officers

To procure aeroplanes of the latest type, to keep such flying officers who are desirous of continuing flying in touch with their profession and, therefore, at all times ready to serve the Empire.
 To demonstrate in a practical manner the commercial possibilities of aeroplane, to foster and create incentive for industrial aeronautics in British Columbia and, through our branches, in various parts of the Dominion.
 To establish club rooms where all interested in aviation may foregather and obtain all technical literature dealing with the science of aerodynamics.
 British Columbia is ideal for aeroplane and secondary manufacture.

British Columbia is ideal for aeroplane and seaplane manufacture, spruce being abundant, while the moderate climate permits flying at all times. Suitable landing grounds for aeroplanes are frequent and the sheltered bays and lakes make it an ideal seaplane country.

Australian Sheep Ranch Patrolled by Aeroplane

Norwich.—Boulton and Paul have shipped a 90 h.p. aeroplane to Lieutenant A. L. Long of the Australian Flying Corps for use in patrolling sheep ranches. The utility of aircraft in this connection is certain to be generally realized, particularly as some of the ranges are 500 miles in length.

#### Imperial Aero Club of Japan to Operate Aerial Mail Service

Tokyo.—H. I. I. the Emperor of Japan has donated 500,000 yen (\$250,000) to the Imperial Aero Club for the purpose of civilian avia ion, and a like amount has been raised by the club. An American, who requests that his name be kept confidential, donated 180,000 yen for the

kept confidential, donated 180,000 yen for the training of Japanese aviators.

The officers of the club are as follows: Honorary president, Prince Kuni; president, Count Okuna; first vice-president, Baron Sakatani; second vice-president, General Nagaok

An aerial mail service between Tokio and Osaka, a distance of 300 miles, will be operated under the supervision of the club.

There is a great interest in aeronautics among the Japanese, but the difficulty in obtaining machines is proving a handicap. European manufacturers are taking advantage of the opportunities.



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon munic -> 🔑 >> 🕬



#### CLUBS

PACIFIC NORTHWEST MODEL AERO
CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE
CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St.,
Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg.,
Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
AERO SCIENCE CLUB OF AMERICA
Beach Bidg. E. 23rd St.,
N. Y. City
AERO CLUB OF LANE TECHNICAL
HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

#### "Model Aeroplane Accessories"

ODELS driven by rubber bands must have besides the anchor hook, a hook that is free to revolve and to which the propeller is fastened. This hook turns in a bearing which varies according to the size and shape of the models. Racing models generally have a bearing made of a piece of brass tubing with the inside diameter just large enough to allow the propeller shaft to turn without any unnecessary play. The tubing is then inserted into a block and fastened into place. This arrangement is not the best especially where large propellers are used because the load is heavier. If the plain bearing consisting of nothing but a tubing with a steel shaft and a thrust washer were used, the friction would be so great that it would absorb nearly half of friction would be so great that it would absorb nearly half of

the available power. To increase the efficiency of the rubber bands by eliminating all the friction possible another type of bearing was designed to take care of the end thrust as well as present a bearing surface for the rotating shaft. This type of bearing is shown in Figure 1. The reader can readily see the construction of the shaft, the ball bearings in place, the propeller hub, and lock mits. The flat end with the hole in it is for a rubber book. This size hearing is used for large models and is exhook. This size bearing is used for large models and is exceptionally strong. Another type is shown in Figure 2. This one has no ball bearing, simply two machined flat surfaces rubbing against one another. This bearing can be used for light or medium weight models. The one in Figure 3 is a better one as it eliminates friction. The bearings mentioned are seldom found on racing models because they are too heavy and the plain tubing bearings answer the purpose as

Figure 4 shows a short piece of ladder type chain used in chain driven models of the old Wright type. Small sprockets of the same pitch are used with this chain and although this type of transmission absorbs considerable power, it is still used on scale.

Figure 5 shows a little bolt used in fine model construction

and is furnished in sizes as small as 1/16" diameter. Of course

and is turnished in sizes as small as 1/10 diameter. Of course some finely constructed models may not contain these fittings, but they are essential to good model construction.

Figure 6 shows an eyebolt 1/16" diameter and very neat in appearance. These are hard to procure today as they were made in Europe and since the war none can be had; however we hope to procure them again as no model is complete without them. They are machined from the best steel and are

very accurate.

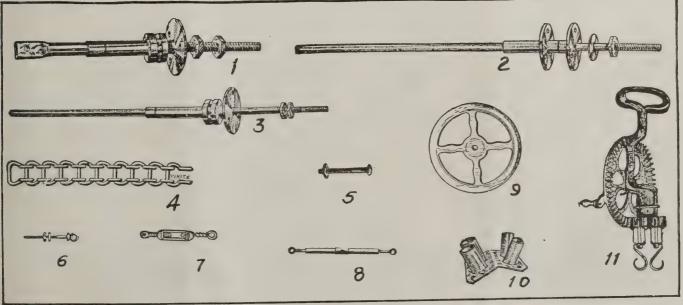
Figure 7 shows a simple turnbuckle with one free end and one threaded end. It is very neat and will add to the appearance of any scale model. The one shown in Figure 8 is more elaborate and of course made much better than the one in Figure 7. It has two threaded ends and of course has a Figure 7. It has two threaded ends and of course has a greater take up than the smaller one. These turnbuckles are generally found on the better and larger size models.

Figure 9 shows a laminated steering wheel and should be used on all Deperdussin or Curtiss controls. These wheels can be purchased in any diameter and are accurately constructed.

Figure 10 shows a four way fitting and is generally used for fastening struts to a pontoon on boat body. The sockets are fastened with silver solder and they are exceptionally

The last, Figure 11, shows a double winder that can be used for double or single propeller models. It is made from the ordinary kitchen egg beater but, of course, is changed around to take care of new work it is called upon to do.

Early in the model aeroplane game model fliers were trying all kinds of ideas and designs for winding the rubbers, trying all kinds of ideas and designs for winding the rubbers, and double motors. Some used an elaborately made affair using a hand drill and a gear arrangement, while others used a single drill with a hook inserted in the chuck which was difficult to use owing to the necessity of winding each rubber separately and counting. Then along came a model flier with this idea and of course it has been improved upon from time to time until it is today a real commercial article and can be purchased at a very moderate price.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Aircraft Lower British Living Cost

London.—The following item indicates the latest attack at the high cost of living in England:

"I am going to send my washing to Paris next week," said an enterprising housewife to a Daily Express representative when told that the Aircraft Manufacturing Company are starting a service to the French capital on Monday, and will take small parcels of laundry there for 3s. 9d.

Hundreds of housewives are now thinking out various schemes to combat the laundry profiteers, who, in addition to charging extortionate prices and adding a high percentage to the total of the bill, demand a guaranteed weekly amount before they will call for the "washing."

"Laundry work to-day is absolutely ruinous to clothes and collars," remarked execution washing and collars, and the intended

collars," remarked another woman, who also said she intended to give the French laundries a trial.

believe I shall get my washing done better and cheaper

in France," she added.

Inquiries made by the Daily Express show that airccraft companies are equally as enterprising as the victimized house-wives, and when the service, which starts on Monday, gets going regularly it is probable that the profiteering laundry firms will receive a rude shock.

"What seems ordinary today, said a shinning light in the aviation world recently, "was probably undreamed of a few centuries ago, and the extraordinry things of today will be the common things of tomorrow. Already I can picture little Tommy waking up in the night and crying, 'Mother, I hear something on the roof,' and hearing mother answer, 'Go to clean deep it's only your father taking off his choses to energy sleep, dear; it's only your father taking off his shoes to sneak in through the skylight. He's just come home from the club in his airship."—Tatler.



Mayor Hylan's Sky Cops— Fruch in the New York World.

#### Remarkable Remarks

William Howard Taft-I am not built for aeroplanes.-Independent.

DEAR AERIAL AGE EDITOR:

Excuse me too forward but I ask to know humbly if American future aeronautics for bright Japanese not quite man but old boy mechanically leaning is so? Maybe be you know if it is not so you to me can if it is tell because the

trade authority in America is Aerial Age.

The names to study good books aeronautical to polish mind of me you can recommend and how many yens but you for to so kind be it is of me much thankful if it too much trouble is not. Not technical however too much please as all

English I do not know so soon for difficult.

Much read for prohibition in America lately newspapers have make idea for drink not without a constitution of Congress. Yet not a drink before we mix but hard without water. If it is to you interested will you to you send promptly if it is not a story of the control of the co if it is yes.

Japanese much yen for aeroplanes to fly for prizes if commercial already has to give and aerial mail Tokio Osaka between soon. The Emperor 500,000 yens all alone for prizes

so generous he himself personally.

The wizard of aviation in America is all there living and were—Wright Curtiss—and still to-day others but more many who see clairvoyant ahead so me in America to be wish also because why not.

So to me you too kind to be by write of now what for me

of one you too kind to be by write or now what for me to do and job with not too much yens without experience not already having been had by me.

I am very pleased if you give me your specially favour for this unpoliteness and impudent desire, and by your letter anytime I shall willingly to go to America.

Anxiously awaiting your answer, and thanking your kind trouble in anticipation. I am,

M. PARASHIMISHIMI.

(Dear Reader: We have sent for the formula. Can you answer the rest of the letter?-ED.)

#### Trés American

Roosevelt Field, L. I. (News Dispatch).-Lieut. William T. Coates and his observer, Lieut. Roullet, who competed in the aerial derby race, were forced to descend near Batavia on their way because of motor trouble.

They landed in a cornfield. The irate farmer galloped at

them, shouting:

"Hey, what you fellers doin' in my cornfield?"

"We just dropped in to make a social call," replied Coates. Then the lieutenant explained the difficulty and said he would remove the aeroplane as soon as he could make repairs. Meantime he and his observer would walk to a telephone and call up headquarters.

"Wall," advised the farmer, "reckon you'll have to walk purty fur up the road to find one. We'll take care of yer velocipede."

Coates and Roullot were gone for more than an hour. When they returned they were startled to see a big sign hanging up where it could be plainly seen down the road, reading:

"See the great American Ace and aeroplane that fell 2,000 feet. Admission, 50 cents."

"They'll get a swell crowd in this lonely place," remarked

Coates. "How's business?" the lieutenant inquired, walking up to

the farmer.
"Purty good, so far," was the reply. "Collected little more'n seventy dollars up to date."



# Airplanes Ready for Immediate Delivery

Genuine Canadian Training Planes, guaranteed to be in first class condition. Inspected and tested by Lt. Col. W. G. Barker, the famous ace of aces.

The Interallied Aircraft Corporation has a limited number of these "Canucks." Prices from \$2600 to \$3000.

They are excellently suited for passenger carrying, aerial advertising or sport flying.

This is part of the nation-wide program of the Interallied Aircraft Corporation to establish aviation on a practical, everyday basis.

Parts for replacement quickly supplied at exceptionally reasonable prices



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Murray Hill 6689





**NEW WORLD'S ALTITUDE RECORD** 34,610 FEET

Established Sept. 18, 1919, by

# ROLAND ROHLFS

who wore a

# (Depollier Waterproof and Dustproof Watch

Prestige-Waltham Movement-Accuracy

U. S. PATENTS: February 22, 1916 September 11, 1917 June 11, 1918 January 28, 1919 June 10, 1919 Patented in Foreign Countries



# **Thermically** Insulated

This Depollier Waterproof case is the same as now adopted by the United States Army.

New York

Over Six Miles Above the Earth, and from Summer heat to 44° Below ZERO and back to normal again without the variation of a second Write for Booklet

Depollier & Son Manufacturers of High Class Specialties for Waltham Watches Ateliers: 316 Herkimer Street Brooklyn,NY Salesrooms 15 Maiden Lane

DUBOIS WATCH CASE CO.

ESTABLISHED 1877



(Continued from page 87)

most favorable conditions for observation. A detailed description of the laboratory follows:

#### Building

The altitude laboratory is housed at present in a temporary building of frame and stucco, having a rectangular floor plan, measuring about 24 by 50 feet. In the near future the present equipment, together with a duplicate set of apparatus, will be set up in a permanent brick and concrete structure, which is being built especially for this purpose. There are no features of the present building to call for special comment.

#### The Altitude Chamber

Early in the preliminary work it was decided that in order to obtain satisfactory results the engine under test would have to be surrounded by the conditions obtained during an actual flight. This necessitated the design of a test chamber of sufficient size to accommodate the largest engine, with the necessary auxiliary apparatus, such as cooling coils and fans, and with sufficient space to work around the engine for adjustments and repair. To meet these requirements a concrete chamber 6 feet 2 inches wide by 15 feet long by 6 feet 6 inches high, inside measurements, was constructed. The walls of the chamber are 1 foot thick, heavily reinforced with ¾-inch steel bars to withstand the pressure of the atmosphere outside the chamber. There are two doors opening on opposite sides of the chamber, 4 feet by 6 feet 6 inches in size. The doors swing on hinges and close against heavy rubber gaskets. They are built up of 2 by 7-inch oak beams,  $4\frac{1}{2}$  feet long and spaced 7 inches between centers, the outside being covered with ½-inch soft wood loosely held with headless nails, and covered over with airproof roofing paper. This construction was adopted to safeguard against possible explosions inside the chamber, in which case the light covering of the doors might be blown off without injury to the concrete walls. Each door contains three small glass windows through which a view of the engine may be obtained during a test. The interior of the chamber is lined with cork for insulation, and to guard against excessive air leaks, the outside is covered with a very heavy coating of asphalt paint.

The chamber may be considered as divided into two parts, the first containing the engine and the second the cooling coils. The engine is mounted on a special stand at the right end of the chamber, as shown in Figs. 1 and 9. In order to control the engine during a test cables are led from the spark and throttle levers, etc., through holes in the walls. The walls are also pierced for the necessary pipes and wiring, each hole being closed by a flange and gasket, through which the connections are made. A perspective view of the chamber with these openings numbered is given in Fig. 2, while a plan view is given in Fig. 3. The uses of these openings vary somewhat with the particular type of engine being tested, but the following may be taken as typical:

- (1) Air inlet to chamber. Controlled by a valve.
- (2) Exhause outlet from engine. (One side of "V" Motor.)
- (3) Ammonia to cooling coils in chamber.
- (4) Exhaust outlet from engine. (One side of "V" Motor.)
- (5) Thermocouple leads.
- (6) Oil inlet, connecting oil pressure tank outside chamber to engine sump.
- (7) Bleeder valve to admit air to chamber.
- (8) Gasoline inlet to carbureter.
- (9) Shaft connecting engine to dynamometer.
- (10) Oil cooling water pipes.
- (11) Electric light and ignition wires.
- (12) Air pipe connecting chamber to exhauster.
- (13) Exhaust gas sampling tubes.
- (14) Exhaust cooling water inlet.
- (15) Jacket water inlet.
- (16) Jacket water outlet.
- (17) Pressure tubes to manometer board.
- (18) Carburator air inlet.
- (19) Pressure tubes to manometer board and engine controls.

(To be continued)



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NEW YORK

LONDON

(Continued from page 88)

used exclusively and run in a continuous bath of oil. The universal plate in the gear reduction is so designed that the entire revolving mass is balanced. The starting motor torque is approximately 12 ft. lbs. and has speed enough working through the reduction of 250 to 1 to crank the engine between 25 and 50 R.P.M., depending on the condition of the engine.

The Liberty is the only starter that combines electric and hand starting in one device, and weighs less than 29 lbs. and develops nearly 2,000 foot pounds on the crankshaft.

In the attachment of the starter to a large motor, no change whatever is necessary, it being fitted direct to the crank case opposite the propeller end, the splines on the motor shaft fitting those in the hub of the gear attached to the motor crank shaft.

The starter is entirely self-contained, and after it has performed its function as a starting device, it acts as a small flywheel, avoiding the necessity of the engaging or disengaging of any gears, clutches or driving mechanism.

Provision is made on the starter case for the attachment of cynchronizing gears, generator or starting magneto, where motors are fitted only with magneto ignition. By the attachment of the generator, current can be supplied for recharging the starting battery, as well as for lights and wireless service. In short, it is a complete electrical generating and starting system, with weight of little more than the average handgeared starter.

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NATIONAL AIR SERVICE

500 Fifth Avenue

New York

# AERIAGE WEEKLY

l. 10, No. 4

**OCTOBER 6, 1919** 

10 CENTS A COPY



An Unusual Photograph Showing the American Supplies at La Mons, France

World Wide Photos

First Aerial Derby Around the World Arouses
World Wide Interest

(PUBLISHED NOVEMBER TWELFTH)



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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York Cit.

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1875 Copyright THE AERIAL AGE CO., October 6, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, OCTOBER 6, 1919

NC

# FIRST AERIAL DERBY AROUND THE WORLD AROUSES WORLD WIDE INTEREST

THE plan of the Aero Club of America and the Aerial League of America to organize an Aerial Derby Around the World is arousing worldwide interest. It is generally stated that the plan is stupendous from every standpoint, aiming to open the World's airways and the organizers having very wisely conceived and adopted the practical plan of permitting the competitors to use different types of aircraft and also permitting the use of other means of transportation for making the connections between aircraft.

Travelers going around the world or on long journeys must, as a rule, use ships, railroads, automobiles and even horses and other animals which are used for transportation and travel in different parts of the world.

By permitting the competitors in the First Aerial Derby Around the World to use every method of transportation, but giving prizes and inducements to reward competitors who use aerial transportation, the organizers are placing aerial transportation on an equal footing with the most progressive methods of transportation; so as to create the habit of using aircraft for travel and transportation.

#### United States Navy to Open the Way for Trans-Pacific Flights

The United States Navy is opening the way for Trans-Pacific flights. The New York Tribune for September 28th made the following announcement:

"The Navy Department has decided to start the land-andwater flight to Brazil before the end of this winter and to launch the first transpacific attempt before June, it was learned to-day.

"Plans for the first venture call for a start from Hampton Roads. It will constitute the first test growing out of the experience gained in the transatlantic flight. The 'planes, which will likely be improved ships of the NC type, will follow the coast to Key West before crossing the Carribbean to Rio de Janeiro.

"Mother ships, such as were employed in the NC journey from Rockaway to Plymouth, will not be used.

"The transpacific flight will start at San Diego. No attempt at speed will be made. As the hazard is greater than in the trans-Carribbean Light, and the distance longer, destroyers from the Pacific fleet will act as station ships to guide the fliers on their 7,000 mile Journey

"The navy's programme for equipping all bases with aviation facilities calls for the maintenance of landing places at every naval establishment on both coasts.

"While most of the naval bases on the Atlantic Coast already have provisions for the reception of seaplanes, the aviation division of the Navy Department intends to have stationed at all naval bases sufficient mechanics to care for 'planes that put in there, as well as covered buildings to house the huge sea birds.

"The programme likewise calls for the expansion of naval aviation to include a full division of seaplanes for both the Atlantic and Pacific fleets. Four major vessels in each fleet will be especially equipped to carry fast scouting 'planes.'

#### Dirigibles to Be Used

The tentative regulations for the Around the World Derby permit the use of dirigibles for a part or all of the journey. As the achievement of the R-34 has shown, the dirigibles of to-day can fly across the Atlantic.

Great Britain is completing some larger dirigibles and it is planned to send one to South America. These large dirigibles are capable of crossing the Pacific and it is quite possible that a number of the entrants for the Around the World Derby shall charter large dirigibles and fly across the Pacific as well as the Atlantic. It is also possible that many of the entrants will use dirigibles in place of aeroplanes for a part of their trip and it is hoped that some of the entrants will attempt to make the trip by dirigibles, so as to demonstrate what the larger airships can do as a means of aerial transportation and for air travel.

#### Commodore Beaumont in Charge of Special Mission to Organize Around the World Derby

Commodore Louis D. Beaumont, a generous, energetic worker and supporter of the Aeronautic Movement, has accepted the Presidency of the Special Mission to go around the world to organize the Aerial Derby. No better selection could have been made. He is an exceptional organizer and an energetic and indefatigable worker, public spirited and liberal, a good entertainer and a thorough sportsman and gentleman. His activities overseas during the War and his many generous contributions to the welfare of the American Air Service and his continuous efforts to add to the welfare of the Allied aviators have won him the admiration of thousands of the aviators of the Allied countries; and he, and the other members of the Commission are assured of a hearty reception in the different countries which they will visit during their trip around the world.

The pioneer work of Captain Charles J. Glidden who. during the Glidden Automobile Tours, went twice around the world and was received by two scores of potentates and by the authorities of several thousands of cities, will combine to insure for the Commission a hearty welcome and a cordial co-operation wherever they go.

(Published November Twelfth)

# TO APPLY THE INTERNATIONAL RULES OF THE AIR IN THE UNITED STATES

(Continued from page 48)

### Rules of the Air

21. Flying machines shall always give way to balloons, fixed or free, and to airships. Airships shall always give way to balloons, whether fixed or free.

22. An airship, when not under its own control, shall be classed as a free balloon.

23. Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing, and angle of elevation of an approaching aircraft. If neither the bearing nor the angle of elevation appreciably change, such risk shall be deemed to exist.

24. The term "risk of collision" shall include risk of

injury due to undue proximity of other aircraft. Every aircraft that is required by these rules to give way to another to avoid collision shall keep a safe distance, having regard to

the circumstances of the case.

25. While observing the rules regarding the risk of collision contained in paragraph 24, a motor-driven aircraft must always manoeuver according to the rules contained in the following paragraphs, as soon as it is apparent that, if it pursues its course, it would pass at a distance of less than 200 meters from any part of another aircraft.

26. When two motor-driven aircraft are meeting end on

or nearly end on end, each shall alter its course to the right.

27. When two motor-driven aircraft are on courses that cross, the aircraft which has the other on its own right side shall keep out of the way of the other.

28. An aircraft overtaking any other shall keep out of the way of the overtaken aircraft by altering its own course to

the right, and must not pass by driving.

Every aircraft coming up with another aircraft from any direction more than 110 degrees from ahead of the latter, i. e., in such a position with reference to the aircraft which it is overtaking that at night it would be unable to see either of that aircraft's side lights, shall be deemed to be an overtaking aircraft, and no subsequent alteration of the bearing between the two aircraft shall make the overtaking aircraft within the meaning of these rules, or relieve it of the duty of keeping clear of the overtaken aircraft until it is finally past and clear

As by day the overtaking aircraft cannot always know with certainty whether it is forward or abaft the direction mentioned above from the other aircraft, it should, if in doubt, assume that it is an overtaking aircraft and keep out of the

29. Where by any of these rules one of the two aircraft is to keep out of the way, the other shall keep its course and speed. When in consequence of thick weather or other causes, the aircraft having the right of way finds itself so close that collision cannot be avoided by the action of the giving way aircraft alone, it shall take such action as will best aid to avert collision.

30. Every aircraft which is directed by these rules to keep out of the way of another aircraft shall, if the circumstances of the case admit, avoid crossing ahead of the other.

31. In the following of an officially recognized air route every aircraft, when it is safe and practicable, shall keep to the right side of such route.

32. All aircraft on land or sea about to ascend shall not attempt to "take off" until there is no risk of collision with allowing aircraft.

alighting aircraft.

33. Every aircraft in a cloud, fog, mist or other conditions of bad visibility, shall proceed with caution, having careful

regard to the existing circumstances and conditions.

34. In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision and to any special circumstances which may render a departure from the above rules necessary to avoid immediate danger.

#### IV Ballast

35. The dropping of ballast other than fine sand or water from aircraft in the air is prohibited.

#### Rules for Air Traffic On and In the Vicinity of Aerodromes

36. At every aerodrome there shall be a flag hoisted in a prominent position which shall indicate that if an aircraft about to land or leave finds it necessary to make a circuit or partial circuit, such circuit shall be left-handed (anti-clockwise) or right-handed (clock-wise), according to the color of the flag. A white flag shall indicate a right handed circuit of the flag. A white flag shall indicate a right-handed circuit i. e., that the flag is kept to the right side or side which carries the green light of the aircraft, and a red flag shall indicate a

left-handed circuit, i. e., that the red flag is kept to the left side which carries the red light of the aircraft.

When an aeroplane starts from an aerodrome it shall not turn until 500 meters distance from the nearest point of the aerodrome, and the turning then must conform with the regulations provided in the preceding paragraph.

38. All aeroplanes flying between 500 and 1 000 meters dis-

cance from the nearest point of an aerodrome shall conform to the above mentioned circuit law, unless such aeroplanes are flying at a greater height than 2,000 meters.

39. Acrobatic landings are prohibited at aerodromes of contracting States used for international air traffic. Aircraft are prohibited from engaging in aerial acrobatics within a distance of at least 2,000 meters from the nearest point of such aerodromes.

40. At every recognized aerodrome the direction of the wind shall be clearly indicated by one or more of the recognized methods, e. g., landing tee, conical streamer, smudge

41. Every aeroplane when taking off or alighting on a recognized aerodrome used for international air traffic shall do so up-wind, except when the natural conditions of the aero-

drome do not permit.

42. In the cases of aeroplanes approaching aerodromes for the purpose of landing, the aeroplane flying at the higher height shall be responsible for avoiding the aeroplane at the lower height, and shall as regards landing observe the rules of paragraph (28) for passing.

43. Aeroplanes showing signals of distress shall be given the rules of paragraph are showing signals of distress shall be given the rules of paragraph.

free way in attempting to make a landing on an aerodrome

44. Every aerodrome shall be considered to consist of three zones when looking up-wind. The right-hand zone shall be the taking off zone, and the left-hand shall be the landing zone. Between these there shall be a neutral zone. An aeroplane when landing should attempt to land as nearly as possible to the neutral zone, but in any case on the left of any aeroplanes which have already landed. After slowing up of coming to a stop at the end of its landing run, an aeroplane will immediately taxi into the neutral zone. Similarly an aeroplane when taking off shall keep as far as possible toward the right of the taking off zone, but shall keep clear to the left the right of the taking off zone, but shall keep clear to the left

aeroplane when taking off shall keep as far as possible toward the right of the taking off zone, but shall keep clear to the left of any aeroplanes which are taking off or about to take off.

45. No aeroplane shall commence to take off until the preceding aeroplane is clear of the aerodrome.

46. The above rules shall apply equally to night landings on aerodromes, when the signals shall be as follows:

(a) A red light shall indicate a left-hand circuit, and a green light shall indicate aright-hand circuit. (See paragraph 36.) The right-hand zone will be marked by white lights placed in the position of an "L" and the left-hand zone will be similarly marked. The "L's" shall be back to back, that is to say, the long sides of the "L's" will indicate the borders of the neutral zone; the direction of landing shall invariably be along the long arm of the "L," and toward the short arm. The lights of the "L's" should be so placed that the lights indicating the top extremity of the long arm shall be the nearest point on the aerodrome upon which an aeroplane can safely touch ground. The lights indicating ground for the aeroplanes, that is, that the aeroplane should not overrun the short arm. (See diagram A.)

(b) Where it is desired to save lights and personnel the following system may be used:

Two lights shall be placed on the windward side of the aerodrome to mark the limits of the neutral zone mentioned in paragraph 44, the line joining the lights being at right angles to the direction of the wind. Two more lights shall be placed as follows: one on the leeward side of the aerodrome on the line drawn parallel to the direction of the wind and passing midway between the two lights on the windward side, and the other shall be placed midway between the two lights marking the limits of the neutral zone. (See diagram B.)

Additional lights may be symmetrically put along the boundary lines of the neutral zone, and on the ends of the taking off and landing zones on the line through the three lights on the windward side.

47. N

General

49. Every aircraft manoeuvering under its own power on the water shall conform to the Regulations for Preventing Collisions at Sea, and for the purposes of these regulations shall be deemed to be a steam-vessel, but shall carry the lights specified in the preceding rules, and not those specified for steam-vessels in the Regulations for Preventing Collisions at Sea, and shall not use, except as specified in paragraphs 17 and 20 above, or be deemed to hear the sound signals specified in the above mentioned Regulations.

50. Nothing in these rules shall exonerate any aircraft, or the owner, pilot, or the crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of the air, or by the special circumstances of the case.

51. Nothing in these rules shall interfere with the operation of any special rule or rules duly made and published relative to navigation of aircraft in the immediate vicinity of any aerodrome or other place, and it shall be obligatory en all owners, pilots, or crews of aircraft, to obey such rules.



# THE NEWS OF THE WEEK



Curtiss Eagle, 8 Passenger Aerial Limousine, in First Demonstration Flight

Roosevelt Field, L. I.—Piloted by Roland Rohlfs, the holder of the world's altitude record, the first public demonstration flights of the 8 passenger Curtiss Eagle were made here on September 27. Six passengers were taken on each trip, and a maximum of 2,000 feet altitude was

attained.

Among the passengers carried in the Eagle were J. Bernard Walker, editor of the Scientific American; Hugh L. Willoughby, of the Technical Committee of the Aero Club of America; F. A. Steele, of the New York Herald; Ernest Wellick, associate editor of Popular Science Monthly; L. Driggs, C. J. Younger, H. A. McCorry; Evan J. David, managing editor of Flying; G. Douglas Wardrop, managing editor, and Edgar H. Felix, associate editor of Aerial Age Weekly.

The Eagle is the first three engined land plane built in the United States, three 150 horsepower K-6 engines being used to rotate three tractor propellers. The engines are equipped with electric

The engines are equipped with electric self-starters.

The fuselage is well streamlined and has a luxurious interior. Eight comfortably upholstered wicker chairs are placed in two rows with an aisle between. At each seat there is a window of triplex glass, affording clear vision to each passenger. The two front seats are for pilots, dual Depurdessin control being used. There is a compartment for lug-

gage at the rear, and the plane, used as an express carrier has a capacity of one

The maximum speed of the Eagle is 107 miles an hour; the gross weight, 7,450 pounds; the landing speed, 54.5 miles an hour; her climb, 4,075 feet in ten minutes; her cruising radius, 350 miles in 3 1/3 hours at full power flight; 475 miles in 6 1/3 hours at economical speed.

The wing span is 61 feet 4 inches and the wing area 770 square feet. The machine will fly well on any two engines and at three-quarters load, or with the fuel supply largely exhausted, one engine is sufficient to maintain her in full flight.

Martin Bomber Makes Cleveland-New

York Flight in 3 Hours 20 Minutes
New York, N. Y.—A Glenn L. Martin
twin-engined bomber made a flight from
Cleveland to New York in 3 hours and 20 minutes. This plane is intended for the transcontinental flight.

The big machine was piloted by Eric Springer, chief test pilot for the Glenn L. Martin Company. It carried three others, William M. Henry, Thomas Carroll and Benjamin Benson. Henry was included in the party so that he could get to a directors' meeting.

Timers announced that when the bomber landed at Hazelburgt Field Mine.

bomber landed at Hazelhurst Field, Mineola, at 3:42 o'clock in the afternoon, the machine had accomplished the distance from Cleveland fifteen minutes faster than the record, which was held by a mail

NC-4 Starts Recruiting Flight
Boston, Mass.—The NC-4 reached Boston, en route for Providence, New London, New Haven, and then southward along the coast, on September 27. The distance between Portland, Maine, and Boston, 150 miles, was covered in 1 hour

42 minutes, averaging 88 miles an hour.
The previous lap of the trip, made on
September 25, between Rockaway and
Portland, was covered in 3 hours 54 min-

The crew of the NC-4 consists of Lieutenant-Commander Read, in command; Lieut. Hinton and Ensign Talbot, pilots; Chief Boatswain Moore, Lieut. Rood, Lieut. Anderson, Lieutenant-Commander Weichelt and Chief Machinists' Mates Kessler and Rhoads.

#### New York-Detroit Flying Boat Trip in Thirteen Hours

Detroit, Mich.-W. M. Blair, piloting a Curtiss "Seagull," arrived here recently after covering the distance between here and Port Washington, Long Island, in 13 hours and 45 minutes. The distance is 700 miles and was covered in the following stages:

Albany to Buffalo..4 hours and 55 minutes

Cleveland to Detroit .........2 hours and 35 minutes

The trip was accomplished without difficulty and, according to Lieutenant Blair, it demonstrated the feasibility of operating a regular service between New York and points on the Great Lakes. With the and points on the Great Lakes. With the single exception of a short distance near Lake Oneida, where the Barge Canal narrows down to 100 feet, landing places are available throughout the frip. With favorable weather conditions, Lieutenant Blair says that the time could be cut down considerably.

# Willoughby, Pioneer Aeronaut, Building New Type Seaplane

Atlantic City, N. J.—Captain Hugh L. Willoughby, who began experimenting with models in 1890, based on photographs and observations of birds, is constructing a new seaplane known as the Willoughby seaplane, Type H. Captain Willoughby built his first aeroplane in 1909 here shortly after assisting Orville Wright in making his first official flight in Wash-



The Curtiss "Eagle," an eight passenger biplane powered by three K-6 engines

Candidate for Massachusetts Office Uses Aeroplane in Campaign

Boston, Mass.—Clarence W. Rowley, candidate for the nomination for Attorney-General on the Republican ticket in Massachusetts, is one of the first candidates for public office in the United States to make a campaign tour by aeroplane. He recently made a flight from Boston to Pittsfield, Mass., in a Curtiss JN-4D to deliver a speech at the Berkshire County Republican outing. The flight was made under the auspices of the Curtiss Aeroplane Company of New England.

#### Aeroplanes Patrol Youngstown Strike Area

Youngstown.—An acrial patrol of the steel strike district here was established on September 24th by the Youngstown

Police Department.
The Youngstown Aviation Club proffered the use of an aeroplane, which was accepted. Captain Deeds, of the Canadian Royal Flying Corps, was selected to pilot the machine. Aerial photographs were taken of activities about the big plants and turned over to the Police Depart-

Two-Passenger Altitude Record Again Reported Broken

Dayton, Ohio.—For the third successive time, Major R. W. Schroeder, chief test pilot at McCook Field, surpassed the world's two-man aeroplane altitude record on September 24th, when he ascended to an indicated height of 30,900 feet or approximately six miles.

A Lepere two-passenger aeroplane was

used in the flight.

#### Aero Club of Syracuse Acquires Three Planes

Syracuse, N. Y.—The Aero Club of Syracuse, which was organized last spring by ex-Air Service men, has acquired three aeroplanes and a landing field. Mr. Charles G. Hanna is president of the club. The field will be maintained until it is taken over by the city authorities as a municipal landing field.

Propeller Noise Tested
Washington, D. C.—Recent tests of propellers made under the supervision of the Air Service operated by noiseless electric motors demonstrate that much of the noise made by an aeroplane is due to the propeller. The effort to perfect a noiseless engine is apparently useless, as nothing can be done to stop the noise made by the propeller.

# Oldest Man in the World Flies at Louisville

Louisville, Ky.-John Shell, reputed to



John Shell enjoys his first aeroplane ride.

he the oldest man in the world, was taken up by M. E. Headley here on September 10. "Uncle" Shell is 131 years old.

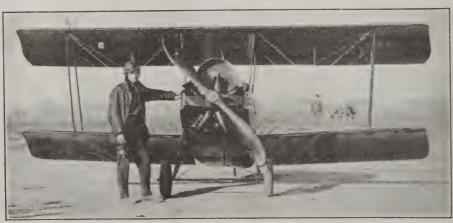
#### Cleveland Technical High School Adds Aviation Course

Cleveland, Ohio—The East Technical High School has announced through its principal, A. R. Reothlisbergs, the addition of an aviation course to its curriculum to which boys only will be eligible. Flying instruction is to follow the ground work.

# New York-Palm Beach Flights This Winter

New York, N. Y .- On November 15th three flying boats of four passengers each will fly from New York to Palm Beach, according to C. N. Rhinehart, of Aero Limited, lnc., which is conducting the New York-Atlantic City service. It is planned to fly three planes weekly to Florida with the required number of flying ida until the required number of flying boats for the southern service have been delivered.

Visibility of 264 Miles in Montana Billings, Mont.—Col. R. S. Hartz, Air Service, made a flight from Miles City to Billings, Mont., a distance of 146 miles, in 116 minutes, on September 23, altitude 8,700 feet, and encountered exceptional visibility. He was able to make out snow-capped mountains at Miles City and recognized objects at a distance of 264 miles. In this aerial journey he flew over mountains at Miles City and recognized objects at a distance of 264 miles. tains having an altitude of 14,000 feet.



The Crawford single seater biplane, for which a speed of 100 m. p. h. is claimed

#### Bureau of Fisheries Reports Successful Aerial Patrol

New York, N. Y.—Reporting on a sea-plane patrol for locating schools of fish, W. W. Welsh of the Bureau of Fisheries recently showed how schools of fish for which vessels may search for many days can readily be found by seaplane patrol. The flight was made from the Cape May Naval Air Station at altitudes between 500 and 1,000 feet and a speed of seventy miles an hour.

"The plane ascended rapidly to about 800 feet and most of the trip was made at that altitude," Mr. Welsh reported "Few schools of fish were seen at first, but as my eye grew accustomed to the conditions many small schools of men-haden were observed, all moving at some depth, and none of them breaking water. Some schools were so near the surface that they appeared as a reddish brown granular mass, amæboid in character and

changing form constantly.

"It is quite possible that schools of large, fat fish might be distinguished from those of smaller, leaner fish, although this would require experience in observation. Another field for experiment would lie in the guidance of fishing steamers to large schools not visible from the crosstrees, but plainly visible from aircraft, and communication by means of wireless tele-phone, harking buoys or other devices would enable the boats to set the seine around the fish invisible to them. Such co-operation would be of great advantage to the naval air service as well as to the fishing interests, as it would provide for the naval aviators excellent practice in scouting, station finding and communica-

"In case such co-operation should be established between the fishing interests and the naval air service, it would be essential that one or more experienced seiners be detained by the fishermen as observers for the aircraft, as the experience of naval aviators has not been such as to enable them, without further training to assist in directing the movements of fishing ves-

# Aeroplane Landing Facilities on Movie Studio Roof

New York, N. Y .- Recognizing the fu-New York, N. Y.—Recognizing the luture of the aeroplane in the motion picture world, the Fox Film Corporation have instructed their architect; Carlson Wiseman, to revise the plans of their huge wiseman, to revise the plans of their ruge new studio so as to provide landing fa-cilities for aircraft. The studio will be erected at 177th street and the Hudson River. Charles F. Willard, chief engineer of the Aeromarine Plane and Motor Company, has been consulted regarding the requirements for a suitable landing

The increased use of aircraft in the plots of films for travel and sport, as well as the excellent results obtained in taking films from planes in flight are given as reasons for the Fox Company's deci-

#### Evansville, Indiana, Establishes Eighty-Acre Landing Field

Evansville, Ind.—An eighty-acre landing field has been established here, as a result of the efforts of the Evansville Aero Club and Graham Brothers Com-pany, the local Curtiss agents. Roderick Wright is the company's aviation superintendent. He has had nearly 4,000 hours in the air and once worked with John Hays Hammond, Jr., on his radio controlled aeroplane.



Rolls-Royce Raising \$7,000,000 for Plant Here
New York, N. Y.—It was learned re-

cently through an announcement made by Claude Johnson, managing director of the Rolls-Royce Company of Derby, England, that plans are being made for the establishment of a branch factory to manufacthe undertaking is to be financed through Aldred & Co., New York bankers, who will provide the capital, probably \$7,000,-000. A factory is to be erected here, but under the present British war act it is not permissible to transfer British capital to this country for such industrial purposes. It was necessary, therefore, to obtain funds necessary in this country before the project could be worked out.

The new venture, it was explained, is the result of a growing demand in America for Rolls-Royce products. Orders now on hand in the British plant will absorb all of the British output for a year and a half, it was said. In 1918 many factories at the request of the British Royce aero engine and that experience is Royce aero engine and that experience is said to have satisfied the company that with proper supervision the Rolls-Royce products can be made here as excellently as they are made in England. While the site of the new factory has not been decided upon, it is known that operations will be directed by experts from England. The chassis to be made in the American and British plants will be identical in every respect. The company has branch houses in New York, London, Madrid, Paris and Bombay.

Aero Limited Acquires Navy HS-2L

Flying Boats

New York, N. Y.—Aero Limited, Inc., of this city, the aerial transportation company which operates a sightseeing flying boat service around Manhattan, was notified that the Navy Department had allotted them five HS-2L flying boats under the competitive bidding sale recently advertised by the navy. They will be immediately placed in the New York-Atlantic City service.

The company has also bids for five

additional boats of this type and ten of the Aeromarine type.

Mr. Reinhardt stated that the cabins would be equipped with reclining chairs and small card and luncheon tables. These aeroplanes will be sent South for operation between Florida resorts on November 15. On the flight down passengers will be carried.

Magneto Manufacturers Issue Booklet New York, N. Y.—The Magneto Manufacturers have issued a booklet entitled "Why Magneto Ignition Makes a Good Engine Better." The booklet is profusely illustrated and shows that although a magneto system is more expensive than a battery system, the operating cost is lower, and it has the advantage of being simpler, more durable and dependable, giving a hotter and better spark at all times, resulting in greater economy and

easier starting.

Personal Par Glenn D. Mitchell, formerly of the Curtiss and L-W-F companies, has taken up work with the Sinclair Refining Com-pany. Mr. Mitchell's first association in pany. the aircraft industry was in connection with the design of the Model T flying boat for the Curtiss Company. He later boat for the Curtiss Company. He later joined the engineering staff of the L-W-F Company. The present outlook for the immediate future of the aircraft is given as the reason for his resignation.

Liberty Fliers Touring the South Baltimore, Md.—The Liberty Fliers, with headquarters here, are arranging an exhibition tour of the South, having completed a successful tour at a series of county fair bookings in the North. Their flying circus consist of acrobatic, stunt and aerial combat flights with from one to four planes.

Bureau of Standards Improved Altimeter

Design
Washington, D. C.—In two devices on which an aviator must depend for information vital to navigation a minute chain plays an important part. Its links meas-ure six-one hundredths of an inch from center to center. This microscopic connection transmits a displacement of one part of the instrument to another having

much greater displacement.

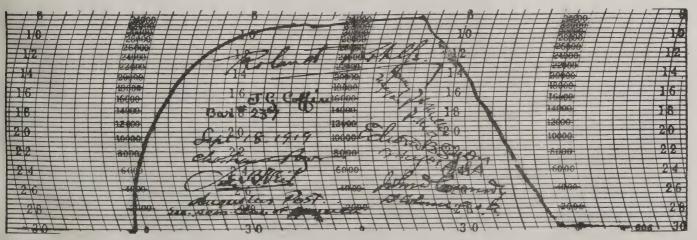
The Bureau of Standards has in progress an investigation of the performance of these chains, which are used in alti-meters and aneroid barometers to link the diaphragm which barely moves to the pointer, which has a comparatively wide range of action. Much of the reliability of the reading of either instrument depends on the smooth operation of this chain snugly wound around a small drum.

At one time steel chains were used. Much of the difficulty with altimeters was caused by the unsatisfactory working of this type. The investigation indicates the superiority of gold chains over steel.

Investigations of the fall of aircraft bombs flying boat hulls and navigation instruments are in progress.

Barographic Record of Rohlfs' Flight
Being Officially Calibrated
Washington, D. C.—Experts at the
Bureau of Standards are calibrating the
barograph record of Roland Rohlfs' altitude flight made at Roosevelt Field on September 18.

The curve shows that Rohlfs climbed 4,000 feet in three and one-half minutes; 6,000 feet in six minutes; 10,000 feet in eight minutes. The curve then shows that Rohlfs' climb became less steep. At 31,000 feet the line shows a slight break. It was at this point that Rohlfs ran into what he believed to be an "air pocket." His ma-chine went from one spin into another His mauntil the pilot discovered that he had not sufficient flying speed. Rohlfs had taken out his air-speed indicator in his efforts to lighten the plane and had no way of knowing his speed except by "feel." He opened his motor and overcame the difficulty. He reached his ceiling—34,610 feet—in 78 minutes. He then began his descent and the line shows that he reached the ground in 35 minutes. The figures from 0 to 34,000 show the altitude and those from 30 to 8 represent the barographic pressure. Each space between the curved lines indicates about 3½ minutes.



The barographic record of Roland Rohlfs' altitude flight which is being calibrated at the Bureau of Standards, Washington



#### New Record for New York—Bellefort Mail Planes

Belmont Park, L. I.—David Logg, who retired recently as a mail aeroplane pilot, made a record trip on September 22 from Bellefort, Pa., to the Belmont Park Field, taking only one hour and forty-one minutes for the flight. He crossed the Alleghenies in the face of a driving rain.

Logg made his last flight on September 23, following which he returned to his home in Seattle, Wash., and resumed a college course which was interrupted by his enlistment in the army air service at the beginning of the war.

#### Berlin-Copenhagen Mail Service Soon

Berlin—The newspapers report that recent discussion between German and foreign firms are likely to lead to Germany's participation in the international air postal service in the near future. Regular air post communication between Berlin and Copenhagen is expected to begin in a fortnight, and negotiations with other Scandinavian countries are proceeding.

An important part of the service will be the conveying of airgrams to relieve the telegraphic service. The air postal service in Germany at present is restricted owing to the extreme shortage of petrol.

# Three-Engined Mail Carrier Under Construction

Washington, D. C.—According to Merrill K. Riddick, formerly of the Aerial Mail Service, where he had more hours of flying time to his credit than any other pilot in the Eastern Division, there is under construction for the Post Office Department a three-engined plane capable of carrying a ton and a half of mail. The total weight of the plane is 19,000 pounds. It is to be equipped with a radio telephone and a radio compass. Her speed is sufficient to cover the New York-Chicago span in seven hours.

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—EASTERN DIVISION

Monthly Report of Operation and Maintenance

AUGUST, 1919

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Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel. Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time	Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
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39A 40A 42 43 65 67 71 73 79 81 83	76.11 367.05 397.28 224.97 15.40 144.05 64.25	4.61 4.00 50.47 50.32 46.97 39.41 1.40 28.10 6.97	53.39 53.39 53.39 53.39 53.39 53.39 53.39 53.39 53.39 53.39	41.30 41.30 41.30 41.30 41.30 41.30 41.30 41.30 41.30	13.20 13.20 13.20 13.20 13.20 13.20 13.20 13.20	41.62 5.93 23.65 52.55 33.51 32.21 53.99 12.53 86.07 23.46	37. 62 13. 77 10. 59 63. 91 276. 23 213. 58 199. 06 10. 70 127. 19 47. 37 202. 77	62.66 202.38 154.63 160.42 323.22 37.74 232.30 96.00	1.40 25.34 	75.00 75.00 72.50 72.50 50.00 50.00 50.00 50.00 50.00	53.84 53.84 53.84 53.84 53.84 53.84 53.84 53.84 53.84	299 .84 487 .71 275 .68 331 .13 699 .22 1,153 .47 1,123 .19 1,080 .58 293 .67 290 .86 4,467 .77	262 1,185 1,146 773 55 494 225	5 2 1 9 43 33 31 1 19 7	45 00 30 53 16 25 08 31 50	478 200 125 872 3,879 3,408 2,520 215 1,720 450	3.3 4.0 3.3 3.2 2.9 3.2 3.9 3.4 2.0	90.60 137.40 220.20 76.20 26.40 33.60 34.20 193.20 45.60 3613.20	1.02 1.37 2.64 .80 .29 .32 .42 1.36 .52 9.92
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# BRAZING, WELDING AND SOLDERING IN AEROPLANE CONSTRUCTION

By B. C. BOULTON

Aeroplane Section, McCook Field

FOR several years there have been decided differences of opinion both in this country and abroad regarding the relative merits of brazing, welding and soldering for aeroplane work. Each process in turn has been used largely to the exclusion of the others, and even at the present time there is no general agreement as to the relative advantages and limitations of the three methods. This condition is due, perhaps, partly to the unsatisfactory results which manufacturers, unacquainted with the details of the operations, may have had with one or another of the methods they used, and partly to lack of knowledge of what is being done by those familiar with the correct procedure. Unfortunately, but little has been written on this important subject that has been of direct assistance to manufacturers or designers interested in those practical details which are essential to successful work. The object of this article is to bring together just such information, and to suggest for what purposes each process is best suited.

The writer is indebted to Messrs. Alfred Hofer and Edward The writer is indebted to Messrs. Alfred Hofer and Edward Edell, of McCook Field, for many valuable suggestions. Mr. Hofer, for the last fifteen years, has been engaged in developing the art of brazing, as applied to both bicycle and aeroplane construction. Mr. Edell is general foreman, in charge of the brazing and metal work in the shops at McCook Field. In order, also, to present the opinions held abroad, brief quotations have been made from a paper that appeared in Aeronautics May 8, 1918, by Messrs. Hackett of Birmingham, manufacturers of steel tubing.

For the sake of clearness, it may be well to give rather carefully the meanings of the terms "brazing, soldering and welding." Soldering or brazing is the uniting of metals by

Soldering or brazing is the uniting of metals by means of a metallic cement, whose melting point is below that of the parts to be joined. Welding is the process of uniting pieces of metal in one mass by hammering or by pressure with or without the application of heat. Therefore, all three processs in question, as applied to aeroplane work, come under the definition of soldering. Autogenous welding should properly be termed "autogenous soldering," as the metals under the action of the oxy-acetylene torch produce their own metallic cement. Brazing differs from what is usually called soldering only in that a copper-zinc alloy is used as the solder. The two processes are often differentiated by the terms hard and soft soldering, respectively. But, since there are hard solders which are not brasses, the use of the word "brazing" avoids confusion. The analogy between brazing and autogenous "welding" is evident in the joining of brass by brazing. In all three processes the "metallic cement" at the joint amalgamates or forms an alloy with the metal that is united is united.

Brazing

There are three classes of brazing: dip, torch and open-Inere are three classes of brazing: dip, torch and open-furnace brazing. In dip brazing the parts are immersed in a bath of molten spelter. This method is well adapted to practically all kinds of small and medium-sized work. Where small parts, such as lugs or sockets, are to be brazed to a main member, brazing with a small oxy-acetylene torch is convenient. For those cases in which a considerable amount of brazing is to be done on parts too big to be dipped, open-furnace brazing with a large gas torch is best.

furnace brazing with a large gas torch is best.

Briefly, the process of brazing consists of cleaning the joint surfaces of the metal, applying a flux at the joint, adding the brazing mixture, heating the parts until the spelter penetrates to every portion of the joint, and when necessary finishing the brazing with proper tools.

In all brazing work the parts must be clean, particularly free from oxide scale. This is most important, because it is

one of the fundamentals of brazing that the spelter will not unite with the steel unless the flux has first reached the steel and left exposed a fresh, raw surface. Although the flux will remove some dirt, and penetrate a thin oxide scale, this action should never be depended upon. A surface may be cleaned mechanically by scraping, filing, grinding, or rubbing with emery cloth; or chemically by the use of alkalis or acids. It is common to clean with emery cloth, then dip in commercial sulphuric acid and thoroughly rinse in water. Grease or oil is frequently removed by a hot, strong alkali solution. The part is then rinsed in water, immersed in an acid bath, and finally carefully rinsed again. If the grease is a mineral one the alkali may not cut it. In such instances, benzine or gasoline should be used.

Only two fluxes are in common use for brazing, borax and Considering their fluxing action, both are satisfactory. Borax, however, leaves a glossy film on the surface of the metal that cannot be removed except in a sand-blast. For this reason boric acid, which can be readily washed off in water after the fittings have cooled, is ordinarily much to be preferred. In case borax is used it should be calcined first to remove the water of crystallization. Calcined borax Calcined borax simply melts on the metal and runs over the surface in a

simply metrs on the metal and runs over the surface in a thin glass, while if uncalcined, the heat causes it to swell, blister, and jump about, so that much of it is lost.

In brazing, a solder that is much used in a 50-50 copperzinc alloy, with a melting point slightly over 1600° F., a tensile strength when cast of about 30,000 pounds per square inch, and an elongation of 3 to 4 per cent. In color, it is a bright yellow. Just why a spelter of this particular composition should be commonly employed is not quite clear.

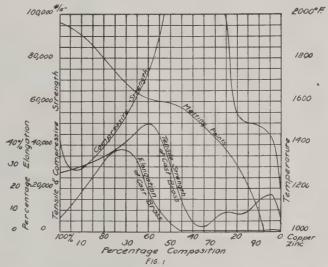


Fig. 1. Properties of Copper-zinc alloys. (U. S. Test Board.)

A study of the curves in Fig. 1 that were prepared from the work done by the U. S. Test Board, which made a thorough investigation of metallic alloys some years ago, shows that as the copper percentage decreases there is an increase in both the elongation and the tensile strength of the alloy. At a little more than 70 per cent, copper, the elongation reaches its maximum value, and at 60 per cent, the tensile strength is a maximum. It will be further noticed that at 55 per cent, both properties are falling off so rapidly that, at slightly less than 50 per cent, copper the brass is a weak, brittle, almost worthless alloy. It would appear that a spelter composed of 60 per cent, copper and 40 per cent zing would be if not the of 60 per cent. copper and 40 per cent. zinc would be, if not the best alloy, at least one much superior to the present commercial product. From the curve of melting points it will be seen that such an alloy has a melting point only 25° F. in excess of that of the 50-50 mixture. Although its ductility of 18 per cent. is much below the maximum, it would be entirely satisfactory, and should reduce the danger of crystallization in the brass due to vibration. So far as the writer has been able to discover there is no reason why a 60-40 spelter should not be used.

Before a fitting can be brazed its various parts must be secured in their correct relative positions either by spot welding or by riveting. Spot welding is convenient and rapid. On the other hand, spot welds are very weak at brazing temperatures and occasionally they fail, allowing the parts of the fitting to slip or fall apart. Spot welding is also apt to cause oxide scale to form in a small area around the weld. The flux will not readily remove this scale on the joint surfaces, so that such places the spelter is liable not to reach.

In minor fittings, and where the brazing area is ample, this is not important. In general, however, the use of light rivets is to be preferred. For most small parts 1/16 in. diameter rivets are sufficient, and for larger work 3/32 in. It must be remembered that when highly heated, these small rivets lose much of their strength, and hence several should be used if the parts joined are at all heavy. Care should be exercised in locating spot welds and rivets that they are not placed at a critical point, such as a transverse section containing a bolt hole. The usual practice is to countersink rivets so that, after brazing, the surface may be filed flat, but in many cases there is no objection to the use of round-head rivets which project a little. It is probably possible to upset rivets so much that the flux and spelter will work up around them with difficulty, but generally rivets will be brazed in solidly.

#### Dip Brasing

Dip brazing is done in a furnace such as is illustrated in This furnace is lined on the bottom and sides, first with a half inch of asbestos, and then with heavy fire brick, 3½ in. thick. The fire bricks on top, as shown in the cut, are movable in order that the opening over the crucible may be varied according to the size of the work to be dipped. To conserve heat, it is best to keep this opening as small as convenience will permit. The crucible itself is made of a mixture of fire brick and graphite. The one shown

has a maximum capacity of about 5 gallons. Owing to the large contraction and expansion caused by the range in tempera-tures to which crucibles are subjected it is necessary to replace them quite frequently. The heat for this furnace is furnished by the combustion of a mixture of air and gas in the chamber formed by the walls of the furnace and the crucible. The gas and air are supplied under slight pressure. They are mixed at "A" and enter each side of the furnace as shown. An almost essential part of the equipment is a reliable pyrometer.

Figs. 3 and 3a illustrate both an electric pyrometer and a platinum rhodium couple which is dipped in the spelter when the temperature of the latter is desired. It should be kept in long enough to come to the temperature of the brass.

Perhaps the most important element to watch in dip brazing is the temperature of the spelter. A few experiments, carried on by Mr. Edell in the shops at McCook

Field, to determine the effect of various temperatures between 1600° F. and 1900° F., indicated that the best results were obtained at 1725°-1750° F. Below 1700° the brazing mixture

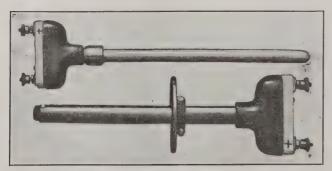


Fig. 3a. Platinum-rhodium Couples.

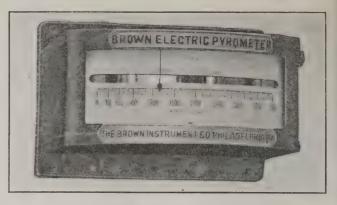


Fig. 3. High Resistance Electric Pyrometer.

did not possess sufficient fluidity; above 1800° the quality of the steel was apt to be seriously impaired by overheating. At 1725°-1750°, when the steel reaches a "light orange" color, it becomes soft, loses its tenacity, and when in thin sheets, if

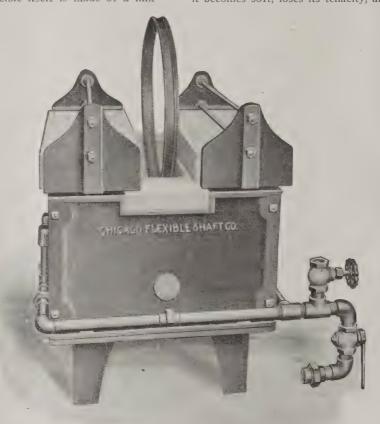


Fig. 2. Dip Brazing Furnace.

immersed in the spelter, tears easily; the microscopic pores and seams in the steel open up; and into joints where the normal clearance is possibly only .001 in. or less, the flux and the spelter penetrate with ease. rise of the brazing in thin joints is caused, not only by gravity or the liquid pressure, but also by capillary action. This principle is especially important in torch brazing and soldering. Although the pyrometer is the only thoroughly reliable means for controlling the temperature, and should never be dispensed with entirely, yet to an experienced man several things serve to indicate the correct degree of heat. At about 1750° the zinc in the spelter begins to volatilize freely in the form of a greenish vapor. When this occurs it is evident that the heat is a little higher than is safe. At a somewhat lower temperature the spelter temperature the spetter bubbles up through the flux in small bursts of yellow flame. The tem-perature at which this occurs varies a bit with the thickness of the layer of flux floating on the spelter, but when this

is normal bubbling is an indication that the spelter is at the

is normal bubbling is an indication that the spelter is at the correct brazing temperature.

One point should be made clear; namely, that at 1750° the brazing mixture is so fluid as to leave only a very thin film of brass about .001 in. thick on the parts that are dipped. In case the clearance is as much as .01 in. it is very likely that the spelter would only coat both surfaces of the joint and then run out, leaving a clear space between the parts, nearly as great as before the dipping. For rough work, where the clearances are large or uncertain, a temperature not much above 1650° should be used if the joint is to be filled solid. However, emphasis must be laid on the principle that, in However, emphasis must be laid on the principle that, in general, in brazing, the thinner the film of brass in a joint the stronger and better the job will be. Suitable limits for this clearance are .001 to .005 in. Where a socket is brazed into the end of a tube considerable difficulty may be experienced in obtaining the correct clearance because of the necessary tolerances in tube diameter and games. It is customary sary tolerances in tube diameter and gages. It is customary to allow a tolerance of .003 to .005 in. in tube diameter and of 10 per cent. in gage. A scheme which has given satisfaction at McCook Field is to ream out the end of the tube to a diameter 1/32 in. greater than that called for, and to machine the sockets to this increased diameter with a tolerance of + .000 and - .002 in. It would be unusual to find many tubes that would not require a slight amount of reaming. If now selective fitting is tried, it is easy to match up tubes and sockets so as to get a snug, hand fit. The minimum clearance should be about .001 in. for every inch of tube diameter. Only with very thin gages will any difficulty be experienced in cutting down the wall thickness too much by this method.

A practical point that is of importance is the thickness of flux to use. This should normally be about 1 in. with the flux entirely melted. When the spelter is heated, the flux is in the form of a semi-vicious liquid, red-hot, floating on top of the molten brass. Besides its main function of preparing the surface of the metal so that the spelter will "wet" it, the flux also prevents oxidation. Since flux completely covers the spelter, the air is kept from contact with the zinc constituent of the brass, which would otherwise rapidly oxidize soon leaving an alloy too rich in copper. This is what occurs if the layer of flux is allowed to become too thin. As the steel parts are dipped in and out of the spelter while heating they would, unless coated by a film of flux, be quickly attacked by the oxygen in the air. The flux, therefore, stops a two-fold waste from oxidation.

Though cold steel parts can be put directly into hot spelter, it is uneconomical to do so. The temperature of the brass is appreciably lowered, especially if the fittings are large. Unless the fuel supply is adjusted, some time is required to restore the normal temperature, and in either case difficulty is experienced in maintaining uniformity in the temperature of the spelter. The time required for the cold metal to heat up 1700° is much longer than is necessary. The use of a suitable preheating oven obviates these troubles. must be used to avoid excessive temperatures in such an oven. A "dark cherry red" about 1175° F. is a sufficient degree of heat. In no case should the temperature be in excess of 1300° which is slightly below the lower critical range. It is always advisable to regulate the temperature with a pyrometer. Preheating ovens are a necessity if a large amount of work is

to be done.

There are several details of procedure in brazing that are of some importance. One of these is the length of time it is necessary to keep a fitting in the spelter. This varies with the size and thickness of the parts, and with their temperature when first put in the brazing furnace. It is quite essentiated the size and thickness of the parts, and with their temperature when first put in the brazing furnace. It is quite essentiated the size of the parts of the par tial that they reach the temperature of the spelter, as a rule, 2 to 5 minutes are required for this. Two facts are of assistance in determining when the parts are ready to be re-moved. First, until steel has been heated nearly to the temperature of the brazing mixture it will float on the surface of the molten brass, between the spelter and the flux. Shortly after the operative feels the fitting slowly sink he knows it will be ready. In a moment, he catches it on his rod and slowly moves it up and down through the flux and spelter. At first the flux sticks to the steel and appears somewhat granular or sugary. But when the brazing is completed, the flux slips off the steel like soft butter. Passing the fitting

flux slips off the steel like soft butter. Passing the fitting through the flux serves another important purpose in insuring that the flux penetrates to all parts.

For handling most types of work it has been found convenient to use a straight rod about 5 feet long, of 3/6 in. round, mild steel stock, with a small hook on one end. The end of the hook is pointed. Most parts that are to be brazed will have one or more holes by means of which they can be picked up after a little "fishing." So much do these holes add to the ease of handling the work that where possible, it is advisable to drill holes for this purpose in case there are none already. Reasonable care must be used not to tear the metal around the holes, especially if it is thin, because the high already. Reasonable care must be used not to tear the metar around the holes, especially if it is thin, because the high temperature renders the steel weak. An operative should not attempt to remove more than one fitting at a time, because if two steel surfaces should be in contact as they leave the spelter and for a few seconds after, they would be brazed together so firmly that it would be almost impossible to sep-

arrate them without injury

In brazing sockets into tubes the parts must be held in place during the operation. Rivets or brazing pins are sometimes used for this purpose, but the simplest and most convenient things are common wire nails, .001 to .002 in. smaller than the holes drilled for them. Because of their heads they cannot slip through the holes, and after the brazing it is easy to cut them off and file the surface smooth. Although for strength requirements it would be unnecessary to insert a socket in a tube a distance greater than 2 or 3 times the gage of the tube, yet for purposes of alignment it is usual to allow a lap of about 1¼ times the diameter of the tube. For large tube diameters, this lap is somewhat less. The extra area gives a considerable factor of safety.

With a large volume of work, varying greatly in size, the use of a big brazing furnace in conjunction with a small one is decidedly economical. The amount of spelter required to fully immerse large fittings is much more than is necessary for minor parts. Beside the extra difficulty of finding small fittings in a big crucible of spelter, more time is required to heat the spelter, and the spelter has to be reheated oftener before being completely used.

Too frequently the materials from which commercial spelter is made are very poor, often waste scraps of metal. For aeroplane work, where so much depends on the strength and reliability of the brazing, it is obviously poor policy to use anything but high quality spelter of known composition.

As a rule, the brazing process will improve rather than

As noted lower the strength of most unheat-treated steels. before, pores in the steel and microscopic flaws due to rolling or forming open up at a temperature of 1700°. The spelter penetrates each minute crevice or pore filling it solid with brass which forms a surface alloy with the steel. This strengthening or "healing" effect is sometimes very noticeable. Also, the heating of the steel above the upper critical range, if not prolonged, followed by air cooling is a form of heattreatment that refines and normalizes the grain of steel.

It must be remembered that the temperatures required in any brazing operation are well above the upper critical range for steel, and that, therefore, if parts have been heat-treated before the brazing they will be reduced to an annealed state by this operation. Unless heat-treated after the brazing, the steel will not have a strength greater than in its normal annealed condition.

#### Current Investigations

The Materials Section of McCook Field, through their metallurgical and testing departments, are now making a careful study of various problems in brazing. Among these is the effect of leaving steel in the spelter for varying periods of time. A few preliminary experiments have shown that the steel gradually goes into solution at the rate of about .001 in. on each surface every two minutes. Incidently, the presence in the spelter of even very small percentages of dissolved iron

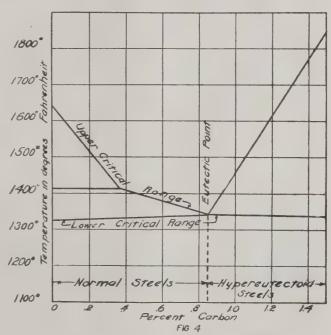


Fig. 4. Critical Range or Carbon-iron Diagram.

has a beneficial effect on the strength of the spelter. The copper iron alloy formed is superior in strength and toughness to pure spelter. There may also be a lowering of the strength and general quality of the steel with prolonged heating. would be due principally to changes in the internal structure of the steel, a coarsening of the grain which only special treatment will eliminate. However, in the experiment neither the yield point nor the ultimate tensile of the specimens appeared to be affected at all by periods of immersion in the spelter varying from 3 to 60 minutes. Tests will be made to find the best composition for brazing spelter. Investigation may show that the addition of small amounts of tin or manganese, forming a bronze, is advantageous. Further experiments are to be carried out to determine what is the brazing temperature for the best type of spelter which will give the strongest and most reliable joints.

#### ALTITUDE LABORATORY FOR THE TESTING OF AERO ENGINES

A Brief Description of the Altitude Laboratory Constructed at the Bureau of Standards for the National Advisory Committee for Aeronautics

#### By H. C. DICKINSON and H. G. BOUTELL

(Continued from page 97)

#### The Engine Support

The engine support was designed for the purpose of duplicating as nearly as possible the flexibility and the inertia of the typical fuselage mounting. The design developed makes possible an accurate adjustment of stiffness as regards transverse and vertical vibration and rotation about each of the three principal axes of the engine. Since no data were at hand as to the corresponding characteristics of any fuselage mountings, the support was constructed on the bases of estimates of these constants, and appears to possess nearly the desired characteristics for the engines mounted on it up to the present time

present time.

The design of this support is illustrated in Fig. 4. Two oak beams, A, in this case 2 by 6 inches, by 6 feet 3 inches long, are supported at the ends to form the basis of the mounting. The engine is mounted directly on two supplementary beams, B, of 2- by 4-inch section and of the length required for the particular engine under test. These supplementary beams are free from the main beams, except at two points, whre they are bolted together through a thin separating block, C. Two yokes, E, are provided to prevent torsion of the individual beams, but have no other effect, as they are free from

contact with any other part of the structure.

Selection of the dimensions of the main beams and adjustment of the spacing between the points of support of the secondary beams permits of adjustment of vertical and lateral stiffness and approximate adjustment of resistance about vertical and horizontal axes at right angles to the axis of the crankshaft. Stiffness as regards rotation about the latter axis can be adjusted by a third beam of proper dimensions rigidly connected at the ends and to the yoke rods, F, although the addition of this member has not been found necessary.

#### The Air Cooling Systems

The air cooling system may be divided into three parts: the refrigerating plant, the cooling system for the carburator air, and the cooling system for the interior of the altitude chamber.

The refrigerating plant is installed in the left-hand portion of the building, as seen in Figs. 1 and 11. The ammonia

compressor is a 9 x 9-inch, double-cylinder, vertical, enclosed machine, with a refrigerating capacity of 25 tons in 24 hours, and was built by the York Mfg. Co., York, Pa. It is belt driven from a 50 horsepower electric motor. The plant operates on the direct expansion system, the ammonia condenser being placed against the outside of the west wall of the building, with the ammonia receiver along the north wall, back of the compressor.

being placed against the outside of the west wall of the building, with the ammonia receiver along the north wall, back of the compressor.

The cooling system for the carburator air consists of a bank of ammonia coils mounted on top of the altitude chamber. The coils are made up of 2,000 feet of 1¼-inch pipe, enclosed in a box and insulated with 4 inches of sawdust. The air is made to pass through this box in a tortuous path, and is then led through an insulated pipe provided with a set of electric heating grids and a regulating valve to the test chamber through opening 18. From this inlet it passes through the air meter to the carburator. In this way warm or cold air may be supplied to the intake as required.

The system for cooling the air within the chamber is made up of a bank of 800 feet of 1½-inch ammonia coils, placed in the left-hand portion of the altitude chamber, as shown in Figs. 1 and 3. Four motor driven fans are provided to force the air over these coils, while another fan is installed to circulate the air past the engine itself when desired.

By means of the refrigerating plant and cooling system just described it is possible to reduce the temperature of the air admitted to the corbustors and that within the test chamber.

By means of the refrigerating plant and cooling system just described it is possible to reduce the temperature of the air admitted to the carburator and that within the test chamber to a point approximating the temperature at any altitude up to about 30,000 to 40,000 feet, depending upon the size of the engine. Owing to the fact that the temperature cannot be readily controlled by means of the refrigerating plant, the air, after cooling and before admission to the carbureter, is passed over a series of electric grids, by means of which the temperature may be again raised and kept at any desired point. The current flowing through these grids is controlled by conveniently placed switches. Some difficulty has been experienced due to the condensation of moisture which occasionally causes a "snow storm" in the air passage to the carbureter. It is hoped that this difficulty will be entirely overcome in the new laboratory, through the elimination of leaks into the refrigerating chamber and the use of what may be termed a "settling chamber," through which the air will pass after

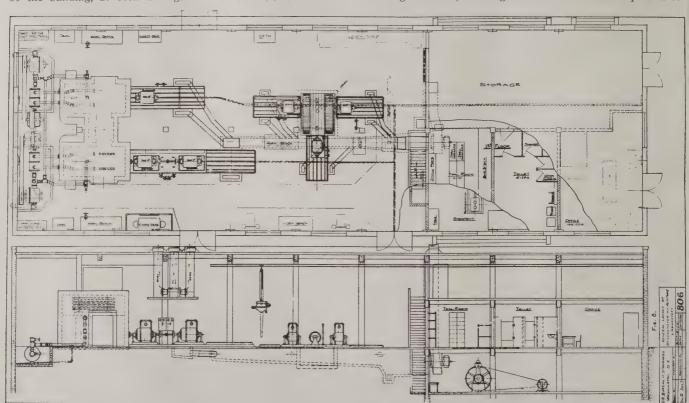


Figure 8. General layout of the dynamometer and altitude laboratory at the Bureau of Standards

being cooled, and in which the air flow will be so sluggish that the snow will be deposited.

#### The Jacket Circulating Water Cooling System

The jacket water cooling system is arranged as follows: Above the altitude chamber is placed a cylindrical iron tank connected to the inlet and outlet pipes of the engine's circulating system, and with another pipes of the engine's circulating system, and with another pipe from the city mains, while an overflow leads to the sewer. A thermostat is placed within the tank, the brass rod of this device controlling a pilot valve which admits or discharges city water from a bellows, which, in turn, controls the main valve on the city supply pipe. In case the temperature of the water in the

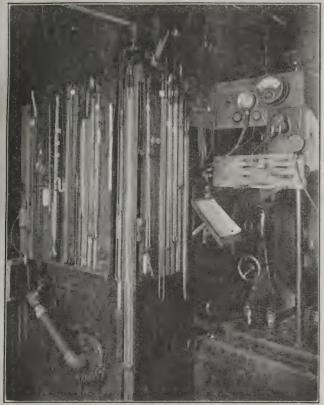


Figure 8. The Manometer Board

tank rises above a certain point, the expansion of the thermostat rod causes the pilot valve to open, admitting water to the bellows, and thus allowing cold water from the city supply mains to flow into the tank. When the temperature has again fallen the contraction of the thermostate rod closes the pilot valve and allows the water to escape slowly from the bellows. Two coil springs then close the main valve, cutting off the

The thermostat is mounted in the fitting through which the water enters the tank from the engine jackets and also from the city mains. It is therefore very sensitive to slight changes in temperature; a very important matter in a laboratory of this sort, since even a comparatively slight variation in the temperature of the circulating water affects the heat distribution in the entire engine. In practice it has been found possible to hold the temperature of the jacket water to a variation of about 5 decree C. tion of about 5 degrees C.

#### The Exhaust Cooling System

The exhaust cooling system is shown diagrammatically in Figs. 3 and 5. The exhaust pipes connected to the engine are water-jacketed, the inner pipe extending down about three feet from the exhaust port, while the outer pipe or jacket is continued from the exhaust port, while the other pipe of lacket manifold in the form of a flexible tube. In this way the whole connection is flexible. This arrangement is clearly shown in Fig. 9. The water from the annular space mixes with the exhaust gases only at a point a considerable distance from the engine. The water enters the altitude chamber through opening 14 and is distributed to the different exhaust pipes

The mixture of exhaust gases and water passed through two five-inch pipes to the auxiliary exhaust tanks, placed just outside the chamber, as shown in Figs. 1, 3 and 11. Here the water is drained off, while the gases pass to the exhauster.

#### The Exhausting System

The auxiliary exhaust tanks are both connected to a 6-inch main which leads to the centrifugal exhauster. Another 3-inch pipe is led from the main directly to the altitude chamber and serves to withdraw the air from the latter, thus maintaining the barometric pressure on the exhaust and within the chamber approximately equal. By means of a valve communicating with the outside air, placed near the exhauster, the pressures maintained may be easily regulated irrespective of

the speed of the pump.

The exhauster is of the Nash "Hydroturbine" type, Size No. 7, made by the Nash Engineering Co., South Norwalk, Conn., and has a rated capacity of 1,500 cubic feet per minute at a 12-inch vacuum, at 300 r.p.m (Fig. 11). It is belt driven from a 75 horsepower, direct current motor, and discharges to a point outside the building.

#### The Dynamometer

The connection from the engine to the dynamometer is made

through the flexible coupling shown in Fig. 7.

The electric dynamometer is mounted on a concrete foundation at the right of the altitude chamber, as shown in Fig. 1. It was built by the Sprague Works of the General Electric Company, and has a rated capacity of 300 horsepower, though it is capable of caring for considerable overloads. The dynamometer consists essentially of a direct current generator, the field ring of which is free to rotate with the armature, except as this rotation is opposed by a connection to a scale beam, which therefore measures the torque delivered to the machine. An auxiliary spring balance is also used, interposed between

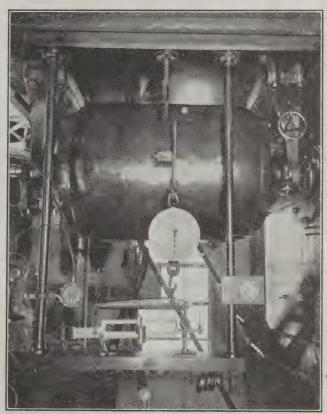


Figure 10. The Electric Dynamometer

the torque arm of the dynamometer and the scale beam, which serves as a handy means for measuring the approximate torque. Current from the dynamometer is controlled from a switchboard placed nearby, and may either be dissipated in grids placed outside the building or may be returned to the regular power lines of the Bureau. The dynamometer with

As the plant was originally laid out for the "Liberty Eight" aeronautic engine, before the "Liberty 12" was decided upon, the 300 horsepower dknamometer selected for th purpose is not capable of carrying continuously the full power of the latter engine. Hence it was necessary to increase the capacity, which was done by the addition of a specially designed water brake. This brake consists of alternate fixed and rotating perforated steel plates. It is illustrated in Fig. 7.

The rotor is mounted on the shaft of the electric dynamome-

ter and the stator is mounted on the dynamometer field, so that the two always operate together; yet the water brake,

Cylinder Drilling and Tapping

# SIII/A Emgimes

"The Motor that made the Spad possible"

EACH operation, however insignificant, is an important mile-stone in the fabrication of Hispano-Suiza Aeronautical Engines.

It follows then that correct engineering principle and design receive their greatest opportunity exemplified innumerable times in this great motor's war-time performance.







# THE CATO SPORTING MONOPLANE

HIS single seater was designed by Joseph L. Cato, principally as a sport plane, the objects in view being a very slow landing speed, quick getaway and ease of control together with inherent stability, good manoeuverability in the air and also to handle well on the ground. A wide chord the air and also to handle well on the ground. A wide chord was used in order to accomplish the performances desired. A special curve had to be laid out as none of the standard curves could be used with any degree of satisfaction. The new curve had been designed to obtain a good climb and slow landing speed rather than high speed. Recent tests have shown this curve to accomplish all it has been designed for, the climb being 4,600 feet in ten minutes with the motor turning 1,350 R.P.M., a high speed 68-70 miles per hour and a landing speed of 22-25 miles per hour. On comparing these actual performance test figures with the following estimated performance figures, it will be noticed that the machine has performance figures, it will be noticed that the machine has more than made good and that the aerodynamical principles are correct.

Constructionally the Cato sport plane shows that much thought and time has been put into the general design. The entire machine is simple in construction, which in turn not only reduces the cost to the manufacturer and brings the selling price within reach of the average sportsman, but makes

it stronger.

It is claimed by the designer that this plane, on landing, can come to a dead stop within 45 feet and get away within 50 feet. A man can run along with the plane and still keep up with it when the wheels start to leave the ground. The longest run made with the highest landing speed was 120 feet to a dead stop. These tests were made with a six mile head wind which might be considered the average wind.

Mr. Cato has kept in mind that in order for a sport plane

to be a successful machine, it must possess the above features and must be easy to fly so that any student with a few hours'

training, can fly it successfully and not require weeks of careful training before he feels that he has confidence enough to make a flight alone.

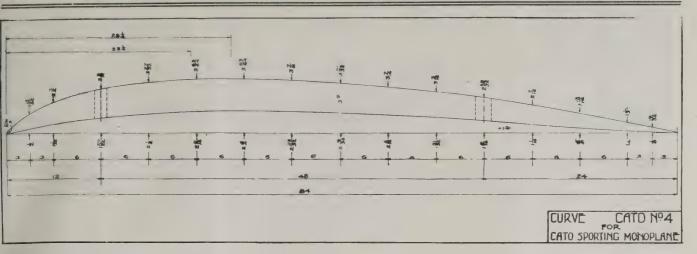
to make a flight alone.

The gasoline tank is located on the right wing and has a capacity of 12 gallons which is sufficient fuel for about three hours endurance. The oil tank is also located in the right wing. Oil and gasoline are supplied to the motor by gravity. No gasoline or oil are carried in the fuselage in order to eliminate any possible chance of fire. The fuselage is of monocoque construction built up of three layers of cedar. It is rather deep and is quite roomy. The fuselage weight, as it comes off the mould, is 58 pounds. It is not necessary for the pilot to sit on the floor of the fuselage in order to be protected from the wind. The seat is 16 inches from the bottom of the fuselage. The top of the fuselage, just to the rear of the motor, is of such shape that the wind is deflected from the pilot, making a wind shield unnecessary. Good vision is one of the features provided by the design.

The power plant is a two cylinder Cato engine mounted on a steel plate riveted to the front end of the fuselage. It is well protected by an aluminum hood, the only part exposed being the two air-cooled cylinders and the carburator intake opening. The service propeller is 7' 2" diameter by 4.38' pitch. The construction of the wings follows more or less standard practice. The wing spars are "I" section and the wing strut attachments are held on by four bolts clamping the spar through maple blocks. The wings are built in two halves and are supported by four main struts and three center section V-struts. The main struts are interchangeable from right to left and from front to rear. The planes are located about 14 inches above the top of the fuselage. The wings have a backsweep of 5 degrees and a dihedral of 2 degrees; the incidence is 4 degrees. The loading is 3.91 lbs. per sq. ft. The inner ends of the ailerons are set back at an angle of The gasoline tank is located on the right wing and has a



Three-quarter view of the Cato Sporting Monoplane



4 degrees so that they will be more effective at very slow speeds. The ailerons are interchangeable from right to left. The stabilizer setting is fixed and cannot be changed in flight. The stabilizer is of the double camber type, in two halves, which are interchangeable from right to left side of fuselage. The elevators are also interchangeable from right to left and they are further interchangeable with the rudder. The fin they are further interchangeable with the rudder. The find is set a little to one side to overcome the propeller torque and relieve the pilot of holding the rudder over. All control cables to tail parts are interchangeable.

The tail skid consists of a three leaf steel spring. The running gear is of the Vee type built entirely of steel tubing. The Vees are interchangeable from right to left. The axle is supported on rubber cord. Large wheels are used in order to provide easy rolling.

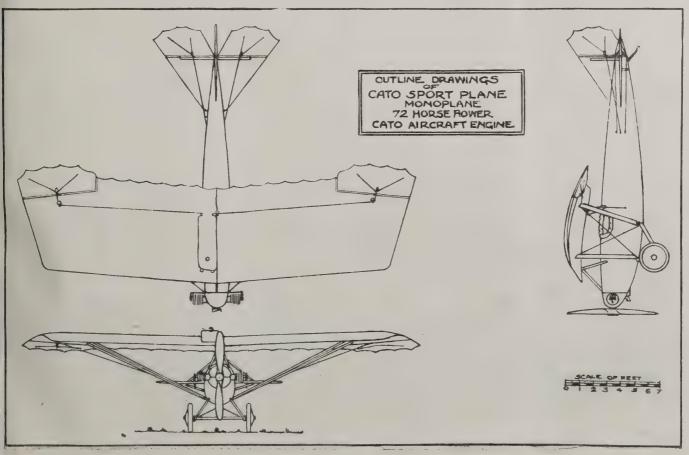
to provide easy rolling.

A stick control is installed which is unusually neat. throttle control is attached to the right side of the fuselage. The rudder bar has three adjustments; short, medium and long. The bottom of the fuselage is 22 inches from the ground and it is possible to step from the ground into the fuselage. The pilot does not have to climb over the top of the fuselage to get in, but merely steps in as he would into an automobile, this being accomplished by having the fuselage cut slightly to one side. The entire machine is well streamlined, which gives it a very neat appearance and makes it pleasing to look at.

The general specifications of the Cato sport plane are as follows:

follows

General Dimensions:	
	. 28' 111/2"
Overall spanOverall length	. 20′ 10″
Chord	. 7' 0"
Areas:	
Total plane area	. 186 sq. ft.
Ailerons, each	4400 0
Stabilizers, each	
Fin	
Elevators, each	
Rudder	
Wing Curve:	
Cato	No. 4
Weights:	
Empty	. 474.26 lbs.
Useful load	. 253.00 lbs.
Fully loaded	
Load per sq. ft	. 3.91 lbs.
Load per horse powerabo	ut 10.1 lbs.
Performances:	
High speed at low altitude	. 68 M.P.H.
Landing speed	. 25 M.P.H.
Climb in 10 minutes	. 4,500 ft.
Ceiling	. 12,000 ft.
Endurance at 68 M.P.H	. 3 hours





# NAVAL and MILITARY \* AERONAUTICS



#### Thirty-eight Entries in Army Transcontinental Race

Washington, D. C .- The War Department announces that thirty-eight aeroplanes have been entered in the Army transcontinental reliability test.

Captain De La Vergne, the French Attache of the French Embassy, has definitely accepted the invitation extended to him to participate in the aerial transcontinental endurance test to be started by the Air Service on October 8th at nine

Captain De La Vergne has had many months' experience on the front com-manding different units of the French Air Service and at one time had in his command twenty of our American flyers. He has numerous decorations both of his

own and other countries.

A partial list of the entries to the New York-San Francisco Reliability Test fol-

lows:

#### NEW YORK-SAN FRANCISCO RELIABILITY TEST

	WEW TORK-SAN PRANCISCO RELIABILITY	TEST
Station	Entrant and Plane	Passenger
O. D. A. S.*	Air Commodore L. E. O. Charlton (Brit.), Bristol Fighter, 115 M.P.H., Rolls-Royce 264 HP.	Flight Lt. P. E. Traill
O. D. A. S.	Capt. de la Vergne (French)	
N. Y.	Colonel G. C. Brant, D.H. 4, 124 M.P.H., Liberty 400 HP.	
O. D. A. S.	Colonel C. C. Culver, Fokker, 100 M.P.H., Mercedes 180 HP.	
Langley	Colonel T. F. Dodd, D.H. 4, 124 M.P.H., Liberty 400 HP.	
O. D. A. S.	Lt. Col. H. E. Hartney	
Langley	Lt. Col. John N. Reynolds, D.H. 4, 124 M.P.H., Liberty 400 HP.	
O. D. A. S.	Major M. F. Davis, Martin Bomber, 112 M.P.H., Liberty 400 HP.	
O. D. A. S.	Major Maxwell N. Y. Kirby, Fokker, 100 M.P.H., Mercedes 180 HP.	
Scott	Major Henry Abbey, D.H. 4, 124 M.P.H., Liberty 400 HP.	Capt. J. Etheridge
Hazelhurst	Major H. J. Miller, D.H. 4, 124 M.P.H., Liberty 400 HP.	Capt. A. E. Simonin
Hazelhurst	Major Edward Lyons, D.H. 4, 124 M.P.H., Liberty 400 HP.	Capt. Harry Smith
Hazelhurst	Capt. Fred Kindley, S.E. 5, 122 M.P.H., Hispano 180 HP.	
Langley O. D. A. S.	Capt. Reynolds, D.H. 4, 124 M.P.H., Liberty 400 HP. Capt. Roy N. Francis, Martin Eomber	
Scott	1st Lt. Alexander Pearson, D.H. 4, 124 M.P.H., Liberty 400 HP.	Sgt. Royal Atkinson
Hazelhurst	1st Lt. John P. Roullat, D.H. 4, 124 M.P.H., Liberty 400 HP.	H. W. Haines, M.S.E.
Hazelhurst	1st Lt. Roberts, D.H. 4, 124 M.P.H., Liberty 400 HP.	2nd Lt. Wm. Coates
Langley	1st Lt. R. B. Bagby, D.H. 4, 124 M.P.H., Liberty 400 HP.	
Langley	1st Lt. H. H. George, D.H. 4, 124 M.P.H., Liberty 400 HP.	
O. D. A. S.	2nd Lt. Wm. C. Foskett Brown, LaPere, 124 M.P.H., Liberty 400 HP.	Corp. Robbins (Mech.)
Middletown	2nd Lt. Fred C. Nelson, D.H. 9, 128 M.P.H., Liberty 400 HP.	1st Lt. Sam M. Lunt
O. D. A. S.	2nd Lt. H. A. McGinnis, D.H. (Bluebird) 124 M.P.H., Liberty 400 HP.	
Hazelhurst	2nd Lt. R. C. Kirkpatrick, D.H. 4, 124 M.P.H., Liberty 400 HP.	2nd Lt. Victor Bean
Hazelhurst Hazelhurst	Lt. W. Maynard, D.H. 4, 124 M.P.H., Liberty 400 HP. 2nd Lt. Willis Taylor, D.H. 4, 124 M.P.H., Liberty 400 HP.	1st Lt. Osbourne 2nd Lt. Howard D. Norris
Langley	2nd Lt. Honsinger, D.H. 4, 124 M.P.H., Liberty 400 HP.	
Chanute	2nd Lt. J. B. Machle, D.H. 4, 124 M.P.H., Liberty 400 HP.	
	* (O. D. A. S.—Officer Director Air Service.	)
	SAN FRANCISCO-NEW YORK RELIABILITY	TEST
Rockwell	Major J. C. P. Bartholf, S.E. 5, 122 M.P.H.,	

	SAN FRANCISCO-NEW YORK RELIABILITY	TEST
Rockwell	Major J. C. P. Bartholf, S.E. 5, 122 M.P.H., Hispano 180 HP.	
Mather	Capt. Lowell H. Smith, D.H. (Bluebird), 124 H.P.H., Liberty 400 HP.	1st Lt. F. W. Ruggles
Mather	1st Lt. Cobert Kauch, D. H. 4, 124 M.P.H.	2nd Lt. Warren A. Maxwell
Rockwell	1st Lt. S. E. Rice, S.E. 5, 122 M.P.H. Hispano 180 HP.	
Rockwell	1st Lt. J. G. Hall, D.H. 4, 124 M.P.H., Liberty 400 HP.	1st Lt. J. P. Richter
Rockwell	2nd Lt. H. E. Queen, D.H. 4, 124 M.P.H.	
Rockwell	2nd Lt. Spencer Hall (D.H. 4) Bluebird, 124 M.P.H.	1st Lt. Wm. Bevan
Rockwell	2nd Lt. F. W. Seifert, S.E. 5, 122 M.P.H. Hispano	

2nd Lt. Robert S. Worthington, S.E. 5, 122 M.P.H.,

Cadet A. J. Nassanier, LePere, 130 M.P.H. Liberty

Mather

Rockwell

Hispano

Present Strength of Army

Washington, D. C.—The Statistics Branch of the General Staff has prepared

the following estimate of the strength of the army as of September 16.

Figures include army field clerks and nurses, but not 267 marines remaining with the expeditionary forces.

Europe	2,329 324 2 499 27,687	8,153 2 7,850 279,722	39,550 8,477 4 8,349 307,409
Total			

#### Eighty-four Per Cent. of Non-Flying Officers Must Be Discharged

Washington, D. C .- In order to comply with the bill now pending in Congress authorizing 1,200 reserve officers in the Air Service, it will be necessary to discharge 31 per cent of the 1,479 flying officers and 84 per cent of the 1,092 nonflying officers now on duty.

#### Rear-Admiral Coontz Succeeds Rear-Admiral Benson as Chief of Operations

Washington, D. C.—Rear Admiral Robert Edward Coontz, now in command of division 6 of the Pacific fleet, was designated nated by the Secretary of the Navy as Chief of Operations of the Navy, succeeding Rear Admiral W. S. Benson, who goes on the retired list after forty-seven years' service. Rear Admiral Coontz will assume his new duties in October.

#### 74 Per Cent. Saving in Liquidation of Air-Craft Contracts

Washington, D. C.-\$63,849,000 has been paid in the liquidation of Air Service contracts up to September oth, according to a statement issued recently, saving 74 per cent of the amount outstanding at the close of the war, which totalled \$245,993,-

#### Air Service Replacements Required for **Expeditionary Armies**

Washington, D. C.—The Statistics Branch of the General Staff has prepared a statement based on the figures for the last six months of active war, showing re-placements required for an expeditionary army. The replacements required are computed by measuring losses and non-effectives against the average strength main taind overseas for both officers and men.

Hospital reserves required initially as a permanent reserve to replace men temporarily non-effective on account of sickness rarily non-effective on account of sickness and injury per thousand of effective strength are as follows: Officers: Slightly sick, 45; slightly wounded, 11.9; total, 56.9 Men: slightly sick, 45; slightly wounded 1; total, 45. The total monthly replace ments for permanent losses are as fol lows: Officers: battle-deaths, 6.1; disease 1.2; other deaths, 7.2; prisoners, 5.8; se verely wounded, 2.5; total 22.8. Men, bat tle-deaths, 1; disease-deaths, 9; other deaths, 3; prisoners, 0; severely wounded, 3; total, 1.6.

These figures, as compared with the other branches of the service, show the Air Service to rank second in replacements of officers required for permanent losses. The totals are as follows: Infantry, 48.8; Air Service, 22.8; tank, 14.5; artillery, 7.2; engineer, 6.2; signal, 5.8; cavalry, 3.3; Q. M. and M. T. C., 2.5; medical, 2.5; Coast Artillery, 1.9; ordnance,

For enlisted men the permanent replacements per thousand are as follows: Infantry, 46.0; tank, 13.5; signal, 7.9; artillery, 7.1; engineer, 5.8; Q. M. and M. T. C., 3.8; medical, 2.9; cavalry, 27; Coast Artillery, 2.4; ordnance, 2.3; Air Service, 1.6.

Navy Plans Two Long Oversea Flights

Washington.—Two long distance sea-plane flights are planned for early next year by the navy, one to Brazil and an-other to the Philippines. Planes of entirely new construction probably will be

Plans of the Department, it was learned, call for the start of the transpacific flight from San Diego, Cal., with a stop at Hawaii, making the first leg 2,000 miles long and longer than the NC-4's Trespassey-Azores voyage, and another stop at

Hampton Roads probably will be selected as the base for the start of the South American flight, ending at Rio Janeiro. The longest leg of this journey will be 1,000 miles, with stops at Guan-tanamo, Cuba, Hayti, Santo Domingo, Trinadad and several South American

ports.

The type of plane to be used in the flights is now under discussion at the

Navy Department.

Air Service Instruction Manuals Compiled

Washington, D. C.—The Training Division of the Air Service has during the past few months devoted a great deal of intensive effort to the systematic compilation of information on all phases of air service activity. Training manuals on Bombardment, Observation and Pursuit have been compiled for the use of the three major arms of the service. Similar text-books are prepared for Aerial Gunnery, Aerial Navigation and other special phases of applied aeronau-

Special data on training, obtained from the extensive records made at the numerous air service training fields, from actual operations against the enemy and from our Allies, has been systematically classified, with obsolete and non-essential

information eliminated.

Ellington Squadron First to Cross Continental Divide

Washington.—The first American aeroplanes to go over the Continental Divide reported to the Air Service on August 22. The pilots were members of the Ellington Field transcontinental recruiting squadron, and they flew from Glenwood Springs to Denver, a distance of 130 miles, in eighty minutes. The greatest altitude reached by the fliers was 16,000 feet. Atmospheric conditions were clear, the air was rough and the average temperature was 80 degrees.

The recruiting squadron was composed of three De Haviland aeroplanes, piloted by Lieutenants Edward W. Killgore, Charles V. Rugh and Eric H. Nelson. Their passengers included Sergeants A. M. Albert, T. Vierra, George W. Anderson and Electrician John J. Kelly.

R. A. F. Pigeon Service Manual

The Air Ministry has placed on sale its Pigeon Service Manual, a comprehensive pamphlet of eighteen pages, covering the care of the pigeon at the loft, its training, its release in flight, its distribution by parachute to isolated forces, the disposal of stray pigeons and an interesting review of some meritorious performances in the service.

During the war many cases occurred in which the crews of aircraft owed salvation from perilous situations entirely as a result of the employment of pigeons, and obviously the great value of their services will not be lost sight of in the de-

velopment of civil aviation.

As the outposts of air commerce advance over the waste tracts of the world, messenger pigeons will have an increasingly great utility, for in flying over the sea or over large expanses of uninhabited country they are an indispensable adjunct to Wireless Telegraphy.

This manual is of great interest not only to the aviation but to any pigeon fancier, for the system of training and methods of care apply to any pigeon. The release of a pigeon in the air must be properly executed to avoid possibility of collision. Experience shows that an outward and downward throw is the most reliable. It is essential that the bird be firmly gripped and energetically thrown to assure the bird falling clear of the plane.

Another important point which the pilot must observe is to fasten the message on the bird with sufficient security that it shall not become unfastened from the clip on the leg, yet that it shall not be too tight to injure the pigeon. It is pointed out that 95 per cent of pigeons released by R. A. F. aviators successfully delivered their messages, and that in practically all cases of failure the aviator has been at fault. During a period of seventeen months on one station alone, birds were liberated on 80 occasions from aircraft in difficulty and often actual peril. In 45 cases the pigeons brought the first information and successful action was taken. One of the birds was shot through the left eye in action, but succeeded in reaching its loft.

Ensign Wood, NC-4 Pilot, Marries Rockaway, N. Y.—Ensign Arthur Ray-mond Wood, one of the pilots of the NC-4 on the trans-Atlantic flight last May, married Miss Louise M. Magnolia of this city on September 17. They became acquainted while Ensign Wood was on duty here during the war. After a year at Tacoma, Washington, they will make their home in New York.

Army Aviators Fly for Flood Sufferers'
Relief Fund

Ranger, Tex.—William Hahnel and Robert Kennedy, two ex-Army aviators, well known for their skillful exhibition work on the coast, have offered to give exhibitions free of cost for the benefit of the sufferers of the recent Texas floods. Not only is this team of aviators famous for its stunt flying but for daring gymnastics on the wings and undercarriage of their plane. Their generous offer has been accepted.

Aeroplanes Hunt Nebraska Bank Robbers

Omaha, Neb.-With the aid of two aeroplanes, three bank robbers who on September 20 held up and robbed the Citizens' State Bank of Ralston, Neb., of \$4,000 were corralled in a cornfield just before dark on the day of the robbery, but aided by a violent rainstorm escaped during the night, despite the cordon of automobile searchlights which surrounded

The two aeroplanes were again called into service. Twice the three men were sighted, but managed to get into the woods along the Platte River and escaped temporarily.

Personal Par

Victor Greiff, after two years' service in the Bureau of Steam Engineering as lieutenant in radio development work, has assumed the duties of research engineer for the American Bosch Magneto Company. Mr. Greiff was formerly connected with the Covic Electrical Company in executive capacity.



An interesting Bleriot model, with four 300 H.P. Hispano-Suiza engines. In the first flight test the tail bracings were insufficiently strong, and the machine was badly crashed



# FOREIGN NEWS



#### French Government Constructing Commercial Airships

French Government Constructing Commercial Airships

Paris, France.—Four rigid airships for experimental commercial air
lines are being constructed under the supervision of the General CoOrdination Board, which was formed last June by a decree signed by
President Poincare and seven ministers. General Duval, director of
Military Aeronautics, was placed in charge of the Board.

The data which is collected on the experimental routes will serve as
a basis for future subsidies for commercial flying in France.
Seaplane and aeroplane services will also be subsidised. Already a
contract is being made with a company to start an air service between
Toulouse and Rabat (Morocco), with intermediate stations at Barcelona, Alicante and Malaga or Madrid and Seville. A definite number of
services each way has to be maintained, and the Government will pay a
subsidy for mail space in each machine.

#### Frenchman Plans Paris-Melbourne Flight

Paris.—An aeroplane flight from France to Australia will be attempted shortly by the French aviator Poulet, it is announced by the Excelsior to-day. The airman plans to start September 29 from Paris with Melbourne as his destination.

principal stopping points as indicated in the plans for the flight ome, Brindisi, Constantinople, Bombay, Calcutta, Bangkok, Singaare Rome, Brindi pore and Batavia

#### Air Force Disposing of Aerodromes

London—The Air Ministry announces that another series of Royal Air Force stations are to be relinquished and disposed of including the following aerodromes: New Bembridge, Scahouses, Scaton Carew, Marham, Tynemouth, Leadenham, Upper Heyford, Usworth, Helperby and Ashington; the seaplane station at Hicking Broad and Bembridge; the balloon base at Lowestoft, and the landing ground at Scale Hall, Lancashire.

#### Bristol Plane Still In Active Service After Two Years' Duty

Amsterdam—Of great interest as proving the period of serviceability of a properly-constructed aeroplane, and incidentally one of the most noteworthy tributes to the unrivalled position of British design and construction, has been brought to the notice of visitors to the Amsterdam Aeronautical Exhibition. In a nearby aerodrome is a "Bristol" Fighter delivered by the constructors in September, 1917. It was immediately put into commission under active service conditions, and after doing considerable work in this direction unfortunately landed in Holland. The pilot was naturally interned and the machine was soon after bought by the Dutch Government. Though it has been continuously flown by Dutch officers it has never been repaired or renovated in any way and every unit is exactly as when it left the "Bristol" Works. Even the "Cellon" dope has never been renewed. The machine is still in service and in great favour with the Dutch pilots.

#### British Aviator Flies from London to Lausanne

Geneva.—Captain Bradley, a British aviator, has landed at Lausanne after having flown over the Alps and lost his way in the clouds above Mont Blanc at an altitude of more than 15,000 feet. He made his trip in a 110-horse-power aeroplane, coming from London by way of Paris.

#### Italian Government Presents Argentina with Aerodrome

Buenos Ayres.—The aerodrome which was purchased by the Italian Government for the use of the Italian Air Force Mission, has been presented to the Argentinian Government complete with modern hangars and several aeroplanes.

#### Development of Anti-Aircraft Guns by Japanese Navy

Tokyo.—According to Astai, the Imperial Navy has been conducting extensive investigations at the Kure Arsenal of naval anti-aircraft guns, and after successfully designing the most complete and effective high angle guns, is producing a large quantity of them. They will be installed on all warships down to submarine in size, as well as on high mountains which surround the Japanese naval ports.

#### Zeppelins Under Construction

Berne.—A despatch received here from Romanshorn, near Constance, says the Germans are continuing to build Zeppelin airships.

The latest airship completed has made a flight from Lake Constance to Berlin in four hours. It carried thirty-eight passengers and their

#### International Air Convention Approved

International Air Convention Approved

London.—The Air Ministry announces:—
The Convention relating to International Air Navigation was formerly approved subject to one or two minor reservations, by the Supreme Council of the Peace Conference, at a meeting held at St. Germain immediately after the signature of the Peace Treaty with Austria on Sept. 10th.

This document, which is one of the most interesting of the agreements made by the Powers taking part in the Peace Conference, is very comprehensive, and deals amongst other things with such subjects as Sovereignty of the Air, Space above Territory and Territorial Waters, International Air Law, Nationality of Aircraft, Certificates of Airworthiness, Conditions of Admission of Air Navigation above Foreign Territory, Rules to Be Observed on Departure, on Landing and When Under Way, Prohibited Articles and the Institution of an International Commission for Air Navigation.

There was little or no precedent to guide the Delegates in the framing of the Convention, and in its drafting it was essential that our Dominions, our Allies and as many as possible of the Neutral States should participate. To secure agreement in eleven weeks as was done on a subject affecting so many different interests is no mean achievement.

The signatories to what may be regarded as the Charter for Civil Aviation throughout the world are as follows:—United States, Great Britain, France, Italy, Japan, Belgium, Brazil, Cuba, Greece, Portugal, Roumania, Serbia.

#### London-Interlaken Service Being Organized

Negotiations for a flying service from London and Paris to Interlaken, Switzerland, with terminals at Lausanne and Lucerne, are pending between an English aeroplane concern and the Swiss government. The aeroplane proposes to carry from thirty to forty passengers and to make the voyage from London to Interlaken within from eight to ten hours. The cost of the trip, it is stated, would not exceed first-class railway travel for a similar distance. The object is to restore tourists travel to Switzerland.

#### London-Paris Service on Schedule Despite Hundred Mile Wind

London-Paris Service on Schedule Despite Hundred Mile Wind
London.—The air service to Paris maintained by Aircraft Transport
and Travel, Ltd., during the week ending August 30th ran from Le
Bourget to Hounslow every day, and from Hounslow to Le Bourget
every day except Thursday.

In the middle of the week the weather rendered flying nearly impossible. On Thursday, August 28th, there was a hundred miles an
hour hurricane over the Channel according to the official weather report.
Under these conditions Lieut. H. Shaw (late R. A. F.) flew an
Airco D.H.4a from Paris to London and did the journey twenty-five
minutes under the scheduled time. A number of parcels and two passengers were carried. The C. G. C. A. (Major-Gen, Sir F. H. Sykes)
has conveyed his congratulations to the company in respect of this
flight, which he considers a very meritorious performance.

Parcels containing various goods have been carried on every trip.
Towards the end of the week business men awoke to the fact that the
service would be maintained despite the weather, and much space has
been booked in advance for passengers and goods.

It is hoped that the arrangements between the British and French
Post Office will soon permit the carrying of express letters by air. It
is understood that the fee will be 2s. 6d. This will include the Post
Office charges for express collection and delivery by motor-cycle and
special messenger. By the speeding up of land connections it is expected
that a letter posted in Lo. don during the morning will reach its recipient in Paris during the early afternoon.

#### The Great Northern Aerial Syndicate Plans Ocean Services

The Great Northern Aerial Syndicate Plans Ocean Services
The Great Northern Aerial Syndicate of Liverpool has planned three routes for their Transatlantic airships to follow:

(1) Liverpool to York, Hull, Copenhagen, Stockholm, Petrograd, Tomsk, Pekin, San Francisco, New York, Queenstown, and Dublin.

(2) Liverpool to London, Paris, Cairo, Colombo, Perth and Melbourne or Sydney.

(3) Liverpool to Cardiff, Lisbon, Sierra Leone, Cape Town, and Buenos Ayres.

The cost of travel is estimated to be only 4d, a mile. The passage from Liverpool to New York is expected to take two and a half days, and Australia may be reached in seven days.

The proposal is to land large airships from New York at Liverpool, and transfer the passengers for other places to smaller craft.

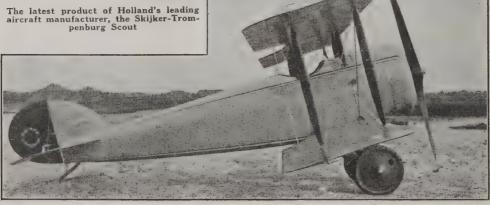
Negotiations have been completed for the lease of landing grounds at different parts, one being at Kingston-on-Thames.

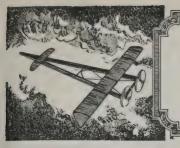
# Aeroplane Engine Muffler Developed by French Army

Paris, France.—After extended tests, it is stated that the French Air Service has approved the Schneebeli muffler for aircraft engines, which is said to completely silence the noise of the engine and to prevent any flame from reaching the open air. the open air.

the open air.

The device consists of a long tube, sealed at the end, a continuation of the exhaust manifold. Around its circumference there is a series of longitudinal fins of triangular section. Communication is made from the interior of the tube to these fins by a series of holes about ½ inch in diameter. Along the face of the fins are cut a very large number of louvres through which the exhaust gases reach the open air.





# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. M-Mahon



#### Model Gearing and Tools for Building

AST week I showed different forms of bearings used in scale and flying models. These are for single strands of rubber. In this issue I am showing geared bearings having reduction or additional gears to give more power to the propeller.

Figures 1 and 3 are geared 1 to 1 and are used simply where it is necessary to add power to a propeller; for instance, with a large diameter propeller. Figures 2 and 4 are geared up—that is, the propeller turns faster than the rubber motors—and this type is used in models having a short fuselage or nacelle where a long motor cannot be installed. These bearings are inexpensive and I should like to see more models using them. The trouble with American model fliers is that they make one type of model because they are more familiar with it, while if they experimented with more elaborate or difficult models more and a better knowledge of aeronautics would be the reward. If our successful designers and builders of large aircraft were to specialize on one type of machine, the aircraft industry would not be where it is today. You are in the same position as these big men in your little model world.

Only a week ago we read of the Lawson Air Liner flying from Wisconsin to Mitchel Field, Mineola, L. I., and from there to Washington, D. C., carrying fourteen passengers. The engineer in charge of this machine, Mr. Vincent Buranelli, was a model builder in the old days and a strict student of aeronautics. His success with both the Continental Pusher (one of the fastest of its type ever developed), along with this new monster air Bus, proves that the aircraft student who builds and flies models is in line for bigger things. I could mention more model fliers who have made good, but space will not allow at the present time.

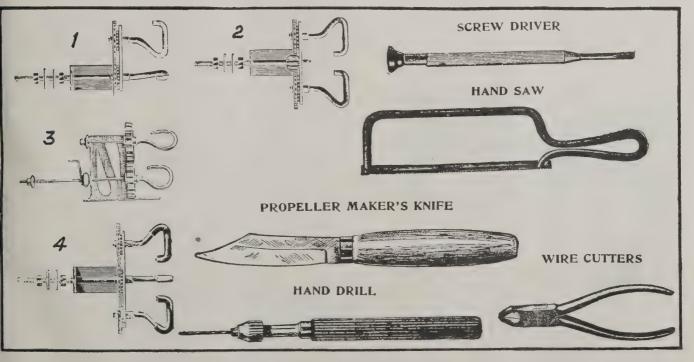
You will note the five simple tools in the illustration that are necessary for good model construction, a small saw, knife, screwdriver, drill, and a wire cutter. These can be purchased from the model supply house at little expense and every model builder should have a set. Of course, there are other tools that can be added to do better work, but these will do anything the model builder will come across in model work.

#### Illinois Model Aero Club

N September 1 the Illinois Model Aero Club, as is its custom once or twice each year, put aside its more common machines of the R. O. G. and hand-launched types and hied itself out to Lake Calumet for a day of swimming, rowing, hydro flying and eating, with no little emphasis on the latter pleasure. Although a most beautiful day for such a combination of events, the first couple of hours were just a bit too windy for the models, so the boys contended themselves, and very successfully too, with the other three sports, but later on several very successful flights were made, the best one, 102 seconds in duration, being made by William Schweitzer, who seems to be running away with most everything nowadays. Mr. Schweitzer is a hard worker in the model work, though, and well deserves the success that is coming to him recently. There was no special prize for this meet, but the results are to count toward the Laird-Weaver Trophy.

On the following Friday there was held the first club meeting since the arrival of the Villard Trophy, and naturally there was even more than the usual amount of interest and enthusiasm shown. It took the form of a sort of jubilee meeting and after the regular business was transacted the members adjourned as a body to the home of one of the boys, where the "victory meeting" was continued in a fitting manner. Needless to say, everyone enjoyed himself thoroughly.

On Sunday afternoon, September 7, Mr. Schweitzer, not content with merely winning both gold medals in the recent contests, and despite the fact that there was no contest, went out to the aviation field at Ashburn and there, in the presence of several other members of the club, broke the world's record for R. O. G. distance with a flight of 4,029 feet. His machine was of the standard twin pusher type with the V frame, but with that careful refinement of the details of construction and design which go to make a record-breaking model. This makes Mr. Schweitzer the holder of two world's records, for it will be remembered that he broke the hand-launched duration record some months ago.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### To the JN-4s

Fly on, fly on, O ship! It's great! Fly on, O Hisso, Spad and Crate! I love to jazz around and fly And chase the clouds about the sky, Take off, old bus, I like the gait. I studied hours about your flight, About your wings all doped and white, About the engine and controls, About your loops and barrel-rolls, About the empanage and struts, And learned to know them like my putts. I've learned to know each sound and shock, To feel the holes and let her rock, I draw a modest shave-tail's pay To fly formation every day.

Oh, Handley Page, keep up your roars, My goat, my mind's entirely yours— Our hearts, our minds, our talk, our jeers, Our lives bound up with all thy gears— Are all with thee, oh, JN-4s.

—Kay-det.

"Say, have you heard about the Chinese Ace?"

"No, how about him?

"Oh, he cracked up One Wing Low."-E. L.

To "take the air" has a new meaning in these whirring days.

#### The Latest Excuse

FARMER—"Hey, there, how came you to be up in my apple-

Boy-"Please, mister, I just fell out of an aeroplane."-London Opinion.

#### Too Late

All the Kings and Queens who are coming to America will not attract much attention now. Too many Aces came over ahead of them.-New York World.

And too many Black Jacks.



A WEIGHTY PROPOSITION: Stout Lady (about to "go up"):
"I wonder if you could accommodate me in the front seat? I should have so much more confidence, and besides I'm so interested in your instruments."

#### Opportunity

A flashily dressed young man entered a large office and equired of the busy boss: "Have you an opening for a bright enquired of the busy boss:

young man?"
"Yes," growled the boss, "and don't slam it as you go out."— American Legion Weekly.

#### Well Fixed

"Heels together! Stand up straight, and button that blouse! Don't you know enough to salute an officer yet?" demanded the C. O. of the new sentry.

"Nope. Just got here yesterday and ain't much acquainted yet."

"Well," replied the C. O., taken aback, "I am the Colonel of the Regiment and the commanding officer of the post."

"Good job, old man. Hang on to it," replied the rookie.— American Legion Weekly.

#### Up For More

(A news item from Spokane, Wash.)—"This is not the first time I have been in the air," said a passenger as he climbed into an aeroplane here for a run over the city. "The other time was when I went up in an explosion."

#### Fly High

Mrs. W. K. Vanderbilt tells this story on herself. She was doing canteen work in France during the recent misunderstanding in that vicinity, and devoted considerable time to entertaining American soldiers in one of the hostess houses. Being a capable dancer and attractive, she was in much demand among the boys. One evening she danced several times with a tall, tow-haired doughboy, who showed symptoms of great loneliness and talked volubly about things back in Michigan.

When the evening ended, the tow-headed one came over to

Mrs. Vanderbilt.

"I've had a bully time," he said, "and I want to keep track of you. We're moving out of here to-morrow for the front. But if we get back, I'd like to look you up over in the States. My name is Albert Bridgeman, from Grand Rapids. What's

"I'm Mrs. W. K. Vanderbilt," she replied.
The doughboy scanned her from head to foot.
"That's right, chicken," he said, "fly high!"—Cartoons

#### Linguistic Difficulties

The French soldier found as much cause to complain about English as she is spoken as our lads did with the lingo over there. One of the tri-color veterans chirped up one day by letting out: "Ze English spoken, pas bon. Here ze sentence: 'What color is ze blackberry when it is green?' and I find out he is red!"—Over Here.

#### Up-to-Date

Chairman Baruch, of the War Industries Board, said at a

Washington banquet:

"I was brought up to consider that it was impossible for a soldier to carry an umbrella. A soldier with an umbrella seemed as absurd to me as a soldier with a fan.

"Well, the other day, in a deluge of rain, I beheld a soldier, a big umbrella over him, stepping along briskly. I stopped my car and said:

"Young man, this is the first time I ever saw a soldier with an umbrella."

"Well, boss,' he answered, 'maybe it's the first time you

"'Well, boss,' he answered, 'maybe it's the first time you ever saw a real, live, up-to-date soldier.'"—Detroit Free Press.



# VOUGHT VE-7 -more than 100% efficientis VALSPARRED

TO attain an efficiency of 107.8 per centfl is a unique A achievement—yet that is the official record of the ought VE-7, winner of the Aerial Derby between New ork and Toronto.

Major R. W. Schroeder, who piloted the Vought VE-7 o victory, in discussing the factors that made such a perormance possible, said:

"A race of this kind could only be won by the combined accuracy of the pilot, the strength and durability of the machine, which consists of many parts and materials.

"The SKIN on my Vought was Valspar Varnish. It was the SKIN that protected the machine from the rain and wind. Therefore I am sure that Valspar did its part by protecting the other parts that they might function properly.'

The Major added that he did not believe he had flown in airplane in two years which was not finished with Valspar. "I trust," he concluded, "that the Valentine Company vill continue to make the best Airplane Varnish.'

#### Aéroplanes VouGHT

EWIS AND VOUGHT CORPORATION

Replying to your letter of Sept.11th, re pleased to inform you that the Vought airplane, with which Major R.W.Schroeder, t., won the New York-Toronto Aerial Handicontest, is finished thruout with Valantine

LEWIS & VOUGHT CORPORATION.

R EAD the above letter from Mr. Chance M. Vought, designer and builder of the VE-7. Mr. Vought is in thorough agreement with Major Schroeder regarding the supremacy of Velspar as THE airplane varnish.

HE THE PROPERTY OF THE PROPERT



## VALENTINE & COMPANY

456 Fourth Avenue, New York

Largest Manufacturers of High-grade Varnishes in the World ESTABLISHED 1832

VALENTINES .

W. P. Fuller & Co., San Francisco and Principal Pacific Coast Citles



The U. S. Martin Army 12 Passenger Transport Plane

Photo @ Underwood & Underwood

# Commercial Aviation Has These Essential Requirements

(2) Comfort and Capacity (3) Speed and Endurance (1) Safety and Dependability These attributes are built into every Martin airplane

#### The Martin 12 Passenger Airplane

Will dominate the commercial field just as the MARTIN BOMBER has demonstrated its military supremacy.



#### The Glenn L. Martin Company

Cleveland

Contractors to the United States Government.

First in War; First in Peace

#### (Continued from page 121)

Perhaps the problem of greatest importance to be solved remaps the problem of greatest importance to be solved is that of the heat-treatment of brazed parts. At present one of the drawbacks to brazing is that brazed steel cannot be assumed to have a strength greater than its strength when annealed. The difficulty in heat-treating brazed parts is that the brazing is apt to melt at the high temperatures often used. Sufficient work has been done on this question to indicate only that satisfactory results can properly be secured with heat-treatment. An examination of the critical temperature chart, Fig. 4, shows that the melting point of the spelter is fairly well above the upper critical range for steel. In heat-

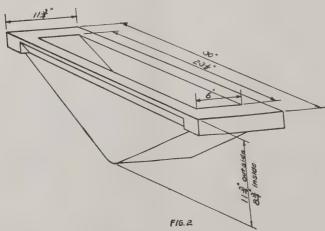


Fig. 2a. Crucible of Dip Brazing Furnace.

treating, a brazed joint, attention should be given to the fact that the condition, not only of the steel, but of the brazing must be considered. For a .2 per cent. carbon steel, heating to 1550° F. and quenching, either in luke-warm water or special quenching oil, then heating once more to nearly 1550° and cooling in the furnace, will probably refine the grain of the

steel and remove any internal strains, and also render the brazing strong and malleable. Care must be taken not to exceed 1550° even with a 60-40 mixture because the spelter will then soften. During the quenching operation the parts must be handled carefully to avoid breaking the joint. A high strength alloy steel should be easier to treat than a simple carbon steel because of the maximum lower temperature required. For a low carbon, 3½ per cent. nickel steel quenching in warm water from 1500° and then drawing to any desired degree is a suitable treatment. For a 4 per cent. carbon, 3½ per cent. nickel steel, the quenching temperature is only 1400°. As suggested in the last two cases, it may be possible to raise the strength of brazed, alloy steel parts to between 100,000 and 200,000 pounds per square inch. steel and remove any internal strains, and also render the

(To be continued)

(Continued from page 123)

when empty, does not interfere with the operation of the electric dynamometer. The water brake alone can absorb 400 electric dynamometer.

horsepower at 1,800 r.p.m.

An unique feature of this brake, made possible by the fact that it is integral with the electric dynamometer, which cares for the adjustments of load, is that it can be operated at any one of four fixed water levels corresponding to four oblong outlets in the casing. When any one of these outlets is opened and the rate of water flow is approximately adjusted, a content water level is maintained, which is reasonably independstant water level is maintained, which is reasonably independent of small variations in supply pressure. Operated in this way the water brake is quite satisfactory, being free from the tendency to "drift" toward higher or lower loads with small changes in water pressure.

#### The Gauge Boards and Engine Controls

The copper tubes for the manometers and the engine control rables are all carried to two boards, mounted at the front right-hand corner of the altitude chamber, as shown in Fig. 13, and so arranged that one man can control the entire plant and at the same time conveniently see all the measuring instruments. In this way the whole plant is under the observation and direction of the Chief Operator at all times.

# "THE PROPELLER THAT BEATS THEM ALL"



Specially designed for Curtiss Airplanes, O.X.5 Motors; it climbs 2,000 ft. in five minutes with full load; it adds 10 miles per hour flying state. Hundreds of them already in use. Some Airplane are being fitted with three seats to utilize the enormous, ower of this propeller. These propellers are carried in stock, ready for immediate delivery. Price, \$50.00 for plain tips; \$70.00 with metal tips, F.O.B.

Airplanes rebuilt; repaired; spare parts; supplies.

# **JACUZZI BROTHERS**

1450 San Pablo Avenue, Berkeley, California

(Contractors of propellers for the United States Government)

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# For Your Flying Boats Use



"Upward of 5000 gallons of the above material has been used by the U S. Navy and War Departments during the as much more by the various manufacs having Government contracts."

> Marine Glue, What to Use and How to Use to Make your Boat Leakproof." plane Float Construction."

FERDINAND & CO.

Boston, Mass., U.S.A.

The spark and throttle levers work in graduated quadrants, which indicate the exact positions of the levers on the engine. The number of these control levers may be varied to suit the number of attachments provided with any particular carbu-

The instruments mounted on the gauge board are as fol-

lows: Venturi gauge for carburator inlet air. Barometer and thermometer. (1) (2) (3)

Manometer for carburator float chamber. Pressure.
Manometer for exhaust back pressure.

Auxiliary barometer.

(6) Manometer showing average pressure in exhaust mani-

(7) Manometer showing the pressure difference between the entrance to the carbureter air, venturi and chamber.

(8) Venturi gauge for jacket water.
(9) Venturi gauge for exhaust cooling water.
(10) Venturi gauge for oil cooling water.
(11) Indicator showing fluctuations of chamber pressure from that desired.
(12) Manometer showing average pressure in inlet manifold

above carbureter choke. (13) Manometer showing difference in pressure between entrance to carbureter and chamber.

Manometer showing carbureter choke pressure.

(15) Manometer indicating the pressure difference between the exhaust port and the chamber.

(16) Venturi gauge on gasoline supply line.

Besides the above, there are the regular gauges and indicators supplied with the particular type of engine under test, which in the case of the "Liberty 12" include:

1. Vapor thermometer giving jacket inlet water temporature

perature.

2. Vapor thermometer giving jacket outlet water temperature. Vapor thermometer giving oil inlet temperature.

4. Vapor thermometer giving oil outlet temperature.

5. Oil pressure gauge. 6. Combined starting switch and ammeter for Delco Ignition System.

A revolution counter, provided with a magnetic, as well as a hand clutch, is attached to the dynamometer shaft.

(To be continued)

ol. 10, No.

OCTOBER 13-20, 1919

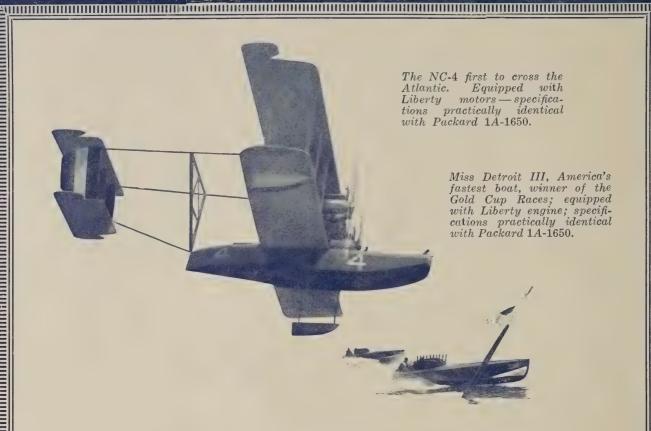
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# CUBA TO SPEND \$15,000,000 ON AERONAUTICS

Third Pan-American Aeronautic Congress and Exposition to be Held in Havana

(This issue published November 22)



# FOR AIRCRAFT

# PACKARD 1A-1650 MOTORS IMMEDIATE DELIVERY—COMPLETE \$4500 f. o. b. DETROIT

FOR the first time Packard offers this noteworthy engine on a commercial basis.

Four pre-eminent features endorse it for all types of aircraft—remarkable flexibility—high fuel efficiency — minimum vibration—extra normal endurance.

It comes from the same shops that produced the wonderful Packard - built Liberty during the period of the war and is tested and approved by the same staff of Packard engineers. It is really comparable ONLY to the famous Liberty motor—with specifications practically identical.

Specifications:
Piston Disp., 1650 cu. in.
R. P. M., 1750
Herse Power, 420
Cylinders, 12 (5 in. x 7 in.)
Crank Shaft, 7 bearings ...
Ignition System—Delco
Oiling System—Pressure

Further specifications of the Packard 1A-1650 will be furnished upon request.



Only a few of the first run of these motors remain unsold. Telegraphic orders advised.

PACKARD MOTOR CAR COMPANY DETROIT, MICHIGAN

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# THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York Cit.

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 187> Copyright THE AERIAL AGE CO., October 6, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

7OL. X

NEW YORK, OCTOBER 13-20, 1919

NO. 5

# CUBA TO SPEND \$15,000,000 IN AERONAUTICS

hird Pan-American Aeronautic Congress, Exposition and Contests To Be Held at Havana, February 21-March 1st, 1920

HAT Cuba is to appropriate \$15,000,000 for the development of aeronautics and to establish aerial mail lines from Cuba to the United States and to other ountries, and is to hold a stupendous Pan-American Aerolautic Congress, with aeroplane races, with over \$25,000 n prizes, and other important events, were announced to he Aero Club of America a few days ago by Mr. Victor Iugo Barranca, Special Representative of His Excellency, Jeneral Mario G. Menocal, President of Cuba.

The announcement was made simultaneously with feneral Menocal's election as a Life Member of the Aero llub of America, and is part of the extensive plan which vill make Cuba the center of aeronautic activities this

vinter and early spring.

General Menocal, who is very much interested in aero-autics, invited the Aero Club of America and the Aerial league of America to hold the Third Pan-American Aero-autic Congress at Havana. It will be recalled that Gen-ral Menocal's invitation was carried by aeroplane last Tay to the aeronautic officials assembled at Atlantic City or the Second Pan-American Aeronautic Congress

Mr. Victor Hugo Barranco received General Menocal's adio message in New York and flew o Atlantic City in an eroplane, notwithstanding a violent storm, and delivered he invitation to Mr. Alan R. Hawley, the President of the dero Club of America, who officiated at the opening of the

After canvassing the people interested in aeronautics the world over, it was found that it would be possible to make he Third Pan-American Aeronautic Congress a great and uge success and General Menocal's invitation was acepted. Being advised that his invitation had been acepted, he cabled to Rear Admiral Robert E. Peary, Presient of the Aerial League of America, as follows:

Rear Admiral Robert E. Peary, Pres. Aerial League of America, N. Y. (297 Mads. Ave.).

YOUR CABLEGRAM ANNOUNCING THE ACCEPTINCE OF MY INVITATION TENDERED TO THE LERO CLUB OF AMA. AND THE AERIAL LEAGUE OF AMA. TO HOLD THE THIRD PAN-AMERICAN LERONAUTICAL CONGRESS IN THIS CITY IS HIGHLY APPRECIATED BY ME THE PRESENCE OF THE LITERIAL CLUB THE ILLUSTRIOUS MEMBERS OF THE AERO CLUB OF AMA. AND OF THE AERIAL LEAGUE OF AMA. N CUBA WILL BE BOTH A PLEASURE AND AN IONOR FOR THE PEOPLE AND GOVERNMENT OF JUBA.

M G MENOCAL, PREST. OF THE REPUBLIC OF CUBA."

A few days ago Mr. Barranco called at the Aero Club f America and transmitted to the Club the contents of an efficial communication received by him from Cuba, antouncing the following important aeronautical developments to take place in Cuba:

(1) Cuba is to spend the sum of \$15,000,000 for the purchase of aeroplanes and dirigibles to establish aerial mail lines from Cuba to the Unied States and to other countries:

2) Over \$25,000 will be awarded in prizes to the aviators participating in the aerial contests to take place next February during the Third Pan-American Aeronautic Con-

huge international aircraft exposition is to be held at Havana, February 21 to March 1, 1920, inclusive, during the Aeronautic Congress, and there will be discussions of important aspects of the progress of aeronau-

tics by the world's leading authorities;

(4) Two huge 16-passenger and four 3passenger aeroplanes have been purchased in France by Mr. Hannibal J. de Mesa, the Cuban sportsman, for the purpose of establishing an aerial transportation line between Cuba and different cities in the United States. Mr. de Mesa found it impossible to get deliveries of American aeroplanes, owing to the great demand for aeroplanes for transportation and sport in the United States, which so far exceeded the supply that it is impossible to get promise for delivery before late next spring from American manufacturers. The officials of the Aero Club of America and the Aerial

League of America are gratified over this important development. Colonel Jefferson de Mont Thompson of the Aero Club of America stated that the action of General Menocal will add a tremendous interest to the development of aeronautics in the Western Hemisphere and will popularize aerial transportation and aerial sport in the immediate future and advance the progress of aeronautics by at least one year.

The Contest Committee of the Aero Club of America and the Aerial League of America are working out details for the contests to be held for the \$25,000 in prizes to be awarded during the Third Pan-American Aeronautic Congress at Havana. It is expected that the world's most famous aviators will participate in these contests, in which the best aeroplanes produced during the last year of the world's aircraft manufacturers will be demonstrated.

AERIAL LEAGUE OF CUBA ORGANIZED
With the co-operation of the Aerial League of America and the Aero Club of America there have been founded in or Cuba an organization known as the AERIAL LEAGUE OF CUBA, of which President Menocal of Cuba is the Honorary President and Mr. Hannibal J. de Mesa, the wealthy Cuban sportsman who bought six aeroplanes and is establishing an aerial line between Cuba and Honorary Vice. States, is President. Other officers and Honorary Vice-Presidents include Cubans in the United States and Cuba.

The Aerial League of Cuba is affiliated with the Aerial League of America, which has a membership of seven

thousand.

The purposes and objects of the Aerial League of Cuba as stated in the certificate of incorporation are as follows: Purposes and Objects

FIRST: The particular objects for which the said corporation is to be formed are the following:

To be a National organization affiliated with the Aerial League of America, through which patriotic Cuban men, women, boys and girls can assist in the work of securing aerial forces which are necessary for the maintenance and protection of our National Institutions, by assisting and educating the Nation to its aeronautic task.

(b) To make known that Aerial Transportation, through

eliminating frontiers and bringing people of different nations into closer contact—as fast transportation always has done—promises to become the most important factor in the reconstruction that will follow the war:

(c) To establish airways and air routes, and promote and encourage in all ways construction of aerodromes, stations and aircraft landing places and other facilities for

air travellers in Cuba.
(d) To co-operate in securing National and International legislation and the formation of proper rules and regulations to govern aerial navigation and to protect the interest of owners and users of aircraft against unjust and unreasonable legislation, and to maintain the lawful rights and privileges of owners and users of all forms of aircraft whenever and wherever such rights and privileges are menaced;

(e) To foster original investigation and development of

every branch of the science and art of aeronautics;
(f) To hold conferences, meets and events intended to

create public interest in aeronautics;

(g) In the discretion of its Board of Directors to award prizes or medals annually, or at such other times as the Board of Directors may deem proper or necessary, to such person or persons as may be by them in their discretion regarded as having been most prominent and distinguished

during the time or during that year or any other time of year, in promoting or exemplifying the broad purposes of the Aerial League of Cuba;

(h) To do everything necessary, suitable and proper to the accomplishment of any of the purposes of the furtherance of any of the powers hereinbefore set forth, and the every other act or acts incidental or annurtenant to be desired. do every other act or acts incidental or appurtenant to o connected with the aforesaid powers or parts thereof.

do every other act or acts incidental or appurtenant to oconnected with the aforesaid powers or parts thereof.

The Honorary and active officers of the Aerial Leagu of Cuba are as follows:

Honorary President, His Excellency, General Mario General, President of Cuba; President, Hannibal J. denocal, President of Cuba; President, Hannibal J. denocal, President of Cuba; President, Hannibal J. denocal, Honorary Vice-Presidents, General Eugenio Sanche Agramento, Miguel Arang, Dr. Louis Azcarate, Hon. Dr. Clements Vazquez Bellos, Dr. Leopoldo Cancio, Dr. Fernando Mendez Capote, Hon. Dr. Jose Manuel Cortina Hon. Dr. Ricardo Dolz, General Jose Harti, Dr. Juan Hon. Dr. Ricardo Dolz, General Jose Harti, Dr. Juan Legino Montalvo, Hon. Dr. Alfredo Porta, Dr. Francisco Deninquez Roldan, Col. Julio Sanguily, Alberto Stantos Dumont, Regino Truffin, Col. Jose R. Villalon, Henry Woodhouse, Rear Admiral Robert E. Peary. Vice-Presidents, Eusebio S. Azpiazu, Carlos De Alzugaray, Elisca Arguelles, Victor Hugo Barranco, H. D. Brown, Dr. Carlo Miguel de Cespedes, Capitano de Kerillis, Carlos de Zaldo Frank Steinhart, Andres Terry Directors, Roberto Aroza rena, Manuel Maria Coronado, Dr. Carlos Manuel de Cespedes, Miguel Espinosa, Dr. Crestes Ferraro, Porfirio Franca, Carlos Garrido, Narcisco Gelate, J. M. Govin Oswald A. Hornsby, Antonio Iraizoz, Jose Marimon, Pable Mendoza, William Merchant, Antonio San Miguel, Jose Ignacio Rivero and Fernando de la Vega.

# OVER ONE THOUSAND AEROPLANES BOUGHT FOR CIVILIAN USE IN SIX MONTHS

REPORT giving figures which prove that the aero-nautic industry can look forward to orders for over nautic industry can look forward to orders for over five thousand aeroplanes next year for civilian purposes was issued at Seattle, Washington, by the Special Commission to Organize the First Aerial Derby Around the World, appointed by the Aero Club of America and the Aerial League of America, which includes Commodore Louis D. Beaumont, president of the Special Commission to Organize the First Aerial Derby Around the World; Alan R. Hawley, president Aero Club of America; Henry Woodhouse, vice-president Aerial League of America; Major Charles J. Glidden, executive secretary of the Commission: Ben Hillman, member of the Commission; Sidney Major Charles J. Glidden, executive secretary of the Commission; Ben Hillman, member of the Commission; Sidney B. Veit, honorary secretary, Foreign Service Committee, Aero Club of America; Harmon August, member Aero Club of America; Lieutenant Colonel S. Herbert Mapes and Captain Mark Ovenden, of the New York City Aerial Police

Since leaving New York October tenth in the private Pullman car "Philadelphia," the Commission and officials of the Aero Club of America and Aerial League of America have investigated the aeronautic activities and studied the demand for aeroplanes in the following cities: Albany, Rochester, Buffalo, Cleveland, Cincinnati, Dayton, Detroit, Milwaukee, Chicago, Minneapolis, St. Paul, St. Louis, Omaha, Kansas City, Memphis, Topeka, Denver, Cheyenne, Portland, Tacoma, Vancouver, and Seattle and other places in the states visited, wheer they conferred with the Governors of the States, Mayors, Chambers of Commerce, Aero Clubs, Automobile Clubs and other commercial, sporting and scientific organizations and obtained all available data as to the present and prospective aeronautic activities.

They found that in Chicago alone three hundred and eighty aeroplanes had been sold since June this year, forty-five in Minneapolis, forty-three in Seattle, thirty-eight in Portland, thirty-two in St. Louis, wenty-eight in Kansas City, twelve in Denver, ten in Cincinnati, and from six to ten in each of twenty other cities, making close to one ten in each of twenty other cities, making close to one thousand aeroplanes sold in the middle and northwestern cities visited. These planes are all used for passenger carrying and transportation and everywhere the Commission was told that people ready to buy aeroplanes were held back by inability on the part of manufacturers to make prompter deliveries and supply larger aeroplanes equipped with several motors to use for long distance transportation and flying boats to use on waterways

Aeroplane dealers in these cities stated they could have sold ten times as many aeroplanes this year if manufacturers had been able to supply the planes. In some places

large automobile dealers have taken up the aeroplane busi ness and stated their readiness to place orders for one hundred machines of each type for next year. One dealer who bought one hundred aeroplanes last June sold then all within sixty days and then bought forty more, which he sold, and could dispose of two hundred more if he could get deliveries. A Chicago dealer sold seven hundred and fifty thousand dollars worth of aircraft parts and supplies

The extensive use of planes for transportation, surveying, passenger carrying and other useful purposes in the middle and northwest was a revelation even to the aeronautic authorities in the party, who for the past ten years as the leaders of the aeronautic movement, have a times been considered ever antimictic

been considered over optimistic.

The report points out that when the Atlantic City Aero nautic Convention started in May all the aeroplanes were owned by the Army and Navy and it took several months for the manufacturers to liquidate their Government orders and secure release of aeroplanes for private use Now that the military restrictions are removed a great to the control of aeronautic boom has started which has practically no limit except a possible failure on the part of manufacturers to

provide suitable aircraft in large enough numbers.

The above-mentioned aeronautic authorities are making an aerial survey of the United States. Commodore Beaumont, Major Glidden and Mr. Hillman will sail for Japan and go around the world organizing the Derby in thirty-

two countries.

# First Aerial Derby Around the World Plans Arouse Country-Wide Interest

The plans for the First Aerial Derby Around the World are arousing country-wide interest. In every city visited the Commission was given a hearty reception. The interest is immense and every city visited has pledged to

make an entry and offer prizes.

The Commission, and accompanying party, left New York at midnight on October 10th, making its first stop the following morning, October 11th, at Rochester, N. Y.

They were met by a large delegation of leading citizens and members of the Chamber of Commerce and Aero Club of Rochester, of which delegation Mr. Charles, Ocumpaugh, president of the Aero Club of Rochester, was president.

Afer visiting the local landing field, the Commission called upon Lieut. E. P. Bayley, U. S. A., who was in charge of the Rochester control for the U. S. Army Transcontinental Air Race, and were then taken to the Genesee Valley Club, wheer a reception was tendered to them, pre-(Continued on page 178.)



# THE NEWS OF THE WEEK



2,000 Mile Cross Country Flight to

Take Son to School

New York, N. Y.—Seymour E. J.

Cox, accompanied by his mother and piloted by H. C. Block, made a cross country flight from Houston, Texas, to Page 2014 Field Lang Island in a to Roosevelt Field, Long Island, in a Curtiss Oriole, arriving here on October 7. The trip was undertaken in tober 7. The trip was undertaken in order to take Seymour to boarding school and for Mrs. Seymour to make a shopping tour in this city. The first stage of the flight was a 285 mile hop from Houston to Dallas. Three days were lost at Binghampton owing to fog.
September 28—Houston to Dallas,

Tex.

September 29-Dallas, Tex, Loanoke, Ark, Belleville, Ill.

September 30-Belleville, Ill., Indianopolis, Ind.

October 1-Indianapolis, Ind., Dayton, Ohio.

October 2-Dayton O., Cleveland,

O., Buffalo, N. Y.
October 3—Buffalo, N. Y., Binghampton, N. Y.
October 7—Binghampton, N. Y.,
Mineola, N. Y.
The trip is a remarkable demonst

The trip is a remarkable demonstration of the economy and reliability of the modern aeroplane used for cross country touring. Although the actual distance flown was about 2,500 miles, covered in a time of 19 hours 45 minutes, only 36 gallons of gasoline and 2 gallons of oil were used by the 150 horsenewer K 6 argins. the 150 horsepower K-6 engine. The cost of the trip, extending over a ten

day period, and including all expenses —hotels, meals, oil, gasoline, incidentals—was less than \$275, or 3 2-3 cents per mile per person.

Safe landings on fields of every variety were made at ten points. No mechanical trouble of any kind was encountered. The engine functioned perfectly, although it has had over 40 hours of flying time and more than 5,000 miles without even so much as the notice in specific plant. changing in spark plug.

Handley Page Flies From Nova Scotia to Long Island

Greenport, L. I.—The four-motored Handley Page biplane, originally built for bombing Berlin and shipped to Newfoundland for the trans-Atlantic flight, made an excellent 600 mile flight from Parrsboro, Nova Scotia to Greenport, Long Island, in October. The landing was made in darkness and squally weather at 11 p. m., owand squally weather at 11 p. m., owing to exhaustion of the fuel supply. Its success was due to the skilful piloting of Major Herbert Brackley who brought the Atlantic to a perfect landing on the outskirts of the village some 80 miles of the craft's destination at Mitchel Field, Hempstead stead.

The start was made at noon from Nova Scotia, with twelve passengers aboard, Vice-Admiral Kerr commanding and Major Brackley piloting. Several newspaper men were carried as passengers.

During the last three hours of the a heavy rainstorm blew journey

across the course at a 40-mile velocity, which greatly reduced the speed of the flight and caused the exhaustion of the fuel supply prior to reaching the objective.

Starting from Parrsboro at noon, Grand Manan, N. B., was passed at 1:20 p. m.; St. John, N. B., 1:30 p. m.; Newport, R. I., 8:45 p. m., and Greenport, L. I., 11 p. m. The Atlantic has a wing spread of 130 feet and is powered by four 350 horsepower Rolls Royce Eagle engines, giving a total of Royce Eagle engines, giving a total of 1,400 horsepower. Thirty persons can be accommodated in her cabin.

The flight is a resumption of the attempt to reach Mineola from Har-

bor Grace, Newfoundland, at the time of the arrival of the R-34, but which was halted at Parsboro by a forced landing in which the plane was badly damaged.

4 Hours 8 Minutes From San Francisco to Los Angeles in Oriole

Los Angeles, Cal. — Emery Rogers, manager of the Syd Chaplin Aircraft Corporation, Curtiss distributors for Southern California and Arizona, recently established a new passenger-carrying non-stop record in a flight between San Francisco and Los Angeles. With one passenger, in a Curtiss Oriole, equipped with a Curtiss K-6, 150 horsepower motor, Rogers made the trip in 4 hours and 8 minutes. The distance covered was 538 miles, and, by train, requires ten It was necessary to fly at 6,000 feet altitude to make the jour-



Commodore Louis D. Beaumont and members of the Special Commission to organize the First Aerial Derby Around the World at Army Balloon School, Fort Omaha, Neb., reading from left to right: Sidney B. Velt, Harmon S. August, Ben Hillman, Major Charles J. Glidden, Commoddre Louis D. Beaumont, Lieut. Col. J. W. S. Wuest, A. Leo Stevens, Alan R. Hawley, Lieut. Col. S. Herbert Mapes, Henry Woodbouse and Mark Ovendon

ney, part of which was over a mountain range and a considerable distance over water.

National Advisory Committee For Aeronautics Holds Annual Meeting

Washington, D. C.—The annual meeting of the National Advisory Committee for Aeronautics was held in Washington on Thursday, October 8, 1919. Dr. Charles D. Walcott was elected chairman for the ensuing year, and Dr. S. W. Stratton, secretary. Members of the Executive Committee were elected as follows: Dr. Joseph S. Ames, Colonel Thurman H. Bane, U. S. A., Captain Thomas T. Craven, U. S. N., Dr. John F. Hayford, Professor Charles F. Marvin, Major General Charles T. Menoher, U. S. A., Dr. S. W. Stratton, Rear Admiral D. W. Taylor, U. S. N., Dr. Charles D. Walcott.

The Executive Committee proceed-

S. N., Dr. Charles D. Walton.

The Executive Committee proceeded to organize for the coming year and elected Dr. Joseph S. Ames, chairman, and Dr. S. W. Stratton,

secretary.

The appointment of Professor George W. Lewis as Executive Officer

was confirmed.

The National Advisory Committee on Aeronautics holds itself at the service of any department or agency of the Government interested in aeronautics for the furnishing of information or assistance in regard to scientific or technical matters relating to aeronautics, and in particular for the investigation and study of problems in this field with a view to their practical solution. It performs this function for individuals, firms and corporations at cost. When it is considered advantageous and profitable the Committee conducts independent re-

searches for the advancement of the science and art of aeronautics. The Advisory Committee acts as a liaison agent, gathering scientific information from all parts of the world, and disseminating it where needed.

# King Albert Flies Over New York City

New York, N. Y.—Albert, King of Belgians, made a flying boat trip over New York City on October 4. After seeing New York from Rodman Wanamaker's yacht, His Majesty expressed a desire to view the city from above. This was communicated to Rear-Admiral Thomas Long, who represents the Navy on the American Commission in charge of the tour of the Belgian royal family. Ensign Frank Lamb was detailed to pilot a navy "F" flying boat for the King.

The seaplane, which is one of the newest and largest of navy aircraft, soared to a height of about one thousand feet, and Ensign Lamb first directed it in a northerly direction as far as Spuyten Suyvil. He then steered the machine in a zigzag course south, passing over the Harlem and East River bridges and crossing the city several times.

The flight was continued to the Battery and over Governor's Island, after which Ensign Lamb steered

The flight was continued to the Battery and over Governor's Island, after which Ensign Lamb steered back to the Columbia Yacht Club basin, where he made a perfect landing. The seaplane's crew, in addition to Ensign Lamb, included Chief Machinist's Mate W. L. Carlton, Chief Radio Observer Edwin Hanna and Assistant Engineer Duffy. King Albert, Count d'Oultremont and Lieutenant Commander Hasler were the passengers.



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AVIATRIX BRINGS SON TO NEW YORK SCHOOL FROM TEXAS VIA AIR
Mrs. Seymour M. J. Cox, a noted aviatrix, arrived at Mineola Flying Field to-day after a
flight from Houston, Texas, with her son, Seymour, Jr. Mrs. Cox made the trip for the
purpose of bring her son to the Raymond Riordan School at Highland. Photo shows
Mrs. Cox, her son, and Mr. Block, pilot, upon arrived at Mineola.

# Governor Olcott Urges Aerial Landing Places For Oregon

Salem, Ore.—Governor Ben. W. Olcott has officially recognized the necessity for establishing aviation landing fields at once so that municipalities may be ready to accommodate freight and passenger carrying aircraft. He urges all municipalities to push forward plans for the preparation of municipal landing fields and cites the valuable work of the forest patrol which has saved thousands of acres of Oregon forest from destruction, as an instance of the possibilities of the employment of aircraft.

# New Jersey Appoints Ovington Aerial Highway Inspector

Trenton.—The State Department of Commerce and Navigation has appointed Earl Ovington, chief of the Curtiss flying station at Atlantic City, inspector of State highways. The board plans for a prompt aerial inspection of dams after storms.

# New Buffalo-New York Record Made in Oriole

Garden City, L. I.—C. S. Jones, winner of second place in the New York-Toronto aerial derby, recently established a new non-stop flight record between Buffalo and New York. In a Curtiss Ox-5, 90 horsepower motor, he made the flight of 450 miles in 4 hours and 5 minutes, breaking the record formerly held by J. D. Hill, another Curtiss pilot, in a machine of the same type, by the scant margin of five minutes. Jones left the Curtiss field at Buffalo at 11:20 in the morning and arrived at Roosevelt field at 3:25 that afternoon.

# Bowman Gives Watches to Toronto Race Participants

New York, N. Y.—John McE. Bowman, donor of the Hotel Commodore prizes for the New York-Toronto race, gave a reception and dinner to those who participated in the race. Winners in the race who were in the Army were precluded by regulation from accepting cash prizes, but received the gold wrist watch, suitably engraved, which was given at the banquet to all contestants. Secretary of State Francis M. Hugo presided as toastmaster, and the speakers included Commodore L. E. O. Charlton, British Air Attache to this country; First Assistant Secretary of War Benedict Crowell, Brig. Gen. William Mitchell, DiDrector of Military Aeronautics; Colonel Archie Miller, and PPolice Commissioner Enright.

# Air Service to Make Mosaics For Engineer Corps

Washington, D. C.—The War Department authorizes publication of the following information:

The Secretary of War advises the chief of engineers that a requisition that aerial photos of all coast defenses within the United States be made is approved and authority for the making of these photos is hereby granted.

However, Department Commanders within the United States, except in case of the Southern Department, have under their commands no Air

Service service units. Furthermore, at the present time, it is possible immediately to undertake this work in the case of only 1 or 2 coast defense districts. Immediate action in the case of the other coast defense districts is not possible at this present moment but should be undertaken as

rapidly as possible.
The chief engineers will furnish to the Air Service maps showing the exact terrain which it is desired to be photographed and a priority list showing the priority desired in the photographing of the various coast defenses. Details for the taking of these aerial photos will be arranged between the Director of Air Service, the Chief of Engineers and the Chief of Coast Artillery. The Director of Air Service is responsible for the completion of this project as soon as possible. The Chief of Engineers having turned over to the Director of Air Service maps showing exact terrain to be photographed and a priority list showing the order of importance of the different projects, his responsibility there ceases.

The Director of Air Service is responsible for the taking of photos and the making of satisfactory mosaics which will then be turned over to the Chief of Engineers. From this point, the responsibility of the Director of Air Service ceases and that of the Chief Engineers is again taken up. As the Director of Air Service comes able to execute a project within a department, he will so inform the Adjutant General, who will notify the Department Commander to facilitate the execution of this work.

# Lawson Air Liner Climbs 15,000 Feet With Ten Passengers

Dayton, Ohio.—The Lawson Air Liner has reached here after negotiating several difficult stages in its long cross country flight. The trip began at Mineola early in September, stops having been made at Cleveland, Buffalo, Syracuse, Mineola, Washington, Connellsville and Dayton. From Dayton, the plane will fly to St. Louis.

In the flight over the Appalachian mountains, the Lawson aeroplane encountered the most severe conditions of the trip. Shortly after leaving Washington, carrying ten passengers in her luxurious cabin, strong head winds at velocities varying from forty to eighty miles an hour greatly



Miss L .Bromwell and Capt. Richard H. Depew, Jr, her instructor, and the Curtiss JN-4D plane on which she received her instruction.

reduced the speed. In an endeavor to avoid these blasts and cross currents, the plane was lifted to an altitude of 15,000 feet, but even at this level the winds were very gusty. After battling with these conditions for four and a half hours the plane fin-ally arrived over Connellsville, and it was decided to make a landing in-stead of proceeding to Dayton, owing to possible exhaustion of the fuel before reaching there. In spite of the difficult cross currents caused by the deep gulleys and precipices in the vicinity a successful landing was made. But the field was not consida successful landing was ered large enough to take off from, so the plane was shipped on gondolas down the river to Dayton.

Some of the stages of the 1,800 mile trip have been covered with remarkable speed. Twelve passengers were carried from Syracuse to Mineola, L. I., 313 miles in 2 hours 32 minutes, and the 250 mile flight to Washington with 14 passengers in 3 hours and a half, in face of very strong head winds.

A feature of the Lawson Air Liner is its quick get-away. It required only 250 feet to take off at Mineola with 16 passengers aboard and 225

feet to get into the air with 19 passengers aboard at Bolling Field, Washington. In one of the first trials at Milwaukee one of the engines was stopped immediately after taking off and the plane climbed 1,000 feet with but one engine running.

Boyce Buys Erwin Patent

Negotiations have recently been ompleted whereby Harrison H. completed whereby Harrison H. Boyce of the Moto-Meter Company, Inc., becomes sole owner of the fundamental Erwin patent, long recognized in the fire extinguisher field as basically covering automatic means of extinguishing fires under the engine hood of passenger cars, trucks and tractors.

It is reported that Mr. Boyce is contemplating forming a new company for the exploitation of this invention, details of which will shortly appear in this magazine.

It is stated, by good authority, that the new fire extinguisher will have many important advantages over those already on the market, and will sell at popular prices.

Bureau of Standards Publishes Aeroplane Antenna Data

Washington, D. C.—The Bureau of Standards has issued a bulletin on its aeroplane antenna investigations prepared by J. M. Cook, assistant physicist at the Bureau entitled "Aeroplane Antenna Constants. No. 341." Copies may be obtained by addressing the Bureau.

Methods for measuring the capacity, inductance, resistance, and natural wave length; also the directional transmitting effect of aeroplane antennas, with the plane in flight, are described. Using these methods, results obtained upon various forms of fixed antennas as well as one, two, and four trailing wires are recorded.

Handley Page Over New York New York, N. Y.—The four engine Handley Page biplane, which made the non-stop flight from Parrsboro, N. S., to Greenport, L. I., was piloted over New York City on October 13 by Vice-Admiral Mark Kerr. Major Brackley, who made the flight from Nova Scotia, A. C. Barker and C. K. McFadden of the Handley Page Company, Dr. Miller Reese Hutchison, Maurice Connelly and Cole J. Younger were carried as passengers.



Twin motored French Bombing and Photography Biplane



# Distributor For Northern Curtiss Pacific Coast States

Portland, Ore.-The Curtiss Aeroplane and Motor Corporation has established a new distributing agency for land machines and flying boats in the states of Washington, Oregon and Idaho. Chester G. Murphy, who is head of the new agency, has opened headquarters in Portland, Oregon. He will establish dealers in the three will establish dealers in the three states and also have branch offices in Boise, Idaho, and Seattle, Washington. In addition to acting as distributor in this territory, Mr. Murphy plans to operate flying schools and passenger-carrying lines. He will also establish several landing fields in the near future. J. D. Hill, an early pilot and until recently assistant to Victor and until recently assistant to Victor Vernon in charge of flying operations for the Curtiss Aeroplane and Motor Corporation, has gone with the new company as has Walter Lees, another Curtiss pre-war pilot. Two Curtiss Seagull flying boats equipped with Curtiss K-6, 150 horsepower motors, have been shipped for use on the Parameter of the Parame curtiss K-6, 150 horsepower motors, have been shipped for use on the Pacific Coast. Three new JN-4D training planes are also being shipped from March Field, Riverside, Calif. The Portland Chamber of Commerce is assisting Mr. Murphy in the establishment of landing fields in Oregon.

# Spitdorf Offers Motorcycle For Transcontinental Race

New York, N. Y.—The aeroplane pilot who makes the best time in the New York-San Francisco race will receive from the Splitdorf Electrical Company an Indian Powerplus motor-cycle carrying full electrical equip-ment—Splitdorf magneto, DUI generment—Spittdorf ammeter and Splitdorf spark plugs. This prize will be given to the pilot regardless of his plane equipment, although it is likely that the winning plane will be Splitdorf equipped because practically all of the entries are using this make of igni-

In order that the pilots may have help at the various landings, the Splitdorf Company has arranged for service men in eleven cities en route. These men will be ready at any time to assist the pilots in whatever work

Aircraft Engineering Progress Aids

Automobile Designers
New York, N. Y.—D. McCall White,
who was prominently concerned in
the development of the Liberty aircraft engine and is now preparing to manufacture motor cars in Indianapolis, stated in an interview here rethe benefits of the experience gained in the manufacture of aircraft engines during the war. Among the valuable lessons learned is the absolute practicability of light-weight construction and the logic of machining parts to close limits.

As a result, according to Mr. White, "we shall have many hollow engine parts of greater diameter than the sold parts recently used, giving them greater strength and durability with less weight." less weight.

Atlantic Coast Aeronautical Station
Centre of Great Activity
Newport News, Va.—The Atlantic
Coast Aeronautical Station and Curtiss aviation school has been reopened here with S. W. Cogswell, a veteran Curtiss' pilot in charge. Mr.
Cogswell has 4,000 hours on many different type of machines and has different type of machines, and has but one accident in that long period. Mr. Cogswell acted as Chief Pilot for Captain Thomas S. Baldwin when he had charge of the station in 1915, 1916 and 1917.

A number of planes have been sold for business and pleasure purposes here recently. The station is equipped to give service to any aerial tourists who may wish to land for gasoline and oil or repairs, there being a complete stock of motor and plane parts and a staff of experts on hand, at all

The difficult problems of machining of alloy steels, the development of heat treatment process through the attainment of closer limits in furnace temperatures and solution of the baffling problem of welding a thin sheet of metal to a thicker one without burning the thinner are among the achievements which the aero-nautic industry has to its credit and which will be applied in motor can construction.

Bosch Adds 58 Service Stations Springfield, Mass.—The American Bosch Magneto Company is continually extending its service facilities. Fifty-eight new service stations have been opened recently, each a well established concern having trained me-chanics whose instructions have been received at the Bosch factory, or one of the factory branches. It is expected, within the next year, that the number of service stations will be doubled. There are now nearly 300 in the United States and 30 or 40 in foreign countries.

Personal Par

At a recent meeting of the directors of The Norma Company of America, Mr. O. P. Wilson, who has been assistant general manager for several years, was elected vice-president of the company. Mr. W. M. Nones con-tinues as president and treasurer, in executive charge of the company's affairs.



W. G. Barker, V. C., Vice-president of the Inter-Allied Aircraft Corporation,

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenantic and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction George L. Conner, Chief Clerk, Aerial Mail Service Eugene J. Scanton, Chief of Supplies John A. Willoughby, Operator in Charge Radio Experiments gene Sibley, Operator in Charge Radio Maintenance and Operation



PILOTS

John M. Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader Charles I. Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton Robert H. Ellis James H. Knight Elmer G. Leonhardt Paul S. Oakes Paul W. Smith Frederick A. Robins Max Miller F. A. Nutter Robinson

Governor Urges Aerial Mail Service
For Porto Rico
San Juan, P. R.—Governor Yager
of Porto Rico is endeavoring to enlist
Federal aid in a mail-carrying project which he is planning between
Porto Rico and St. Thomas. Mail is
now carried by slow sailing vessels
and, although the distance between
the two islands is only thirty miles, it
requires more than twenty-four hours. requires more than twenty-four hours. There are no regular mail boats in operation. A flying boat could make the trip in less than half an hour. It is also planned to open up an aerial mail service between Porto Rico and San Domingo and Hayti.

There is a great opportunity for aeroplanes on the island, especially in connection with the great sugar fields for use of supervisors in trips over the plantations, many of which cover thousands of acres. Roads are not the best in the world, and, with an automobile, these inspection trips require a great expenditure of time. With an aeroplane, it will be a matter of minutes where it is now a question of hours. Aerial views from tion of hours. Aerial views from time to time will give a splendid idea of crop conditions for the use of officers of the sugar companies without making the tedious and tiresome trip.

Emergency Landing Field on New York-Washington Route Donated Washington, D. C.—Major W. R. Baldwin of the Ordinance Department has offered the Air Service the use of a large pasture field at Elks Mills, Maryland, as an emergency landing field.

For the purpose of landing and ex-For the purpose of landing and examining the field, Colonel John N. Reynolds, A. S. A., and Captain Harry C. Drayton, A. S. A., recently flew a Curtiss aeroplane to Elks Mills, Maryland. These officers report the landing field to be on the direct route, from Washington to New York, being 52 miles northeast of Baltimore and on the main line of the B. & O. Railroad and four miles directly north of road, and four miles directly north of Elkton, Maryland, is extremely easy to find. Also the Elk River runs past Elks Mills to Elkton and the Chesa-

To Replant Forests from Aeroplanes Washington, D. C.—The Forestry Service was urged by Representative Service was urged by hepresentative Dandall (Cal.) to start a reforestation programme for the fire-denuded areas in the Sierra Madre range by using aeroplanes to scatter millions of tree seeds over these mountains as one of the rainy season begins. soon as the rainy season begins.

After his conference with service officials, Mr. Randall wired civic organizations in Pacific coast cities to organize forestry associations to press action by the Government.

Yale Honors Read

New Haven, Conn.—Lieut. Commander A. C. Read of the NC-4, the navy's famous flying boat, received a bicentennial medal from the university in honor of his achievement in flying across the Atlantic. The ceremony took place in Woodbridge Hall, President Hadley making the presentation.

resident Hadley making the presentation address.

In response, Commander Read paid tribute to Yale's contribution to naval aviation. Read was visiting New Haven on the NC-4, which is making the resulting tribute of the Atlantic tribute of the Atlantic tribute. recruiting trip down the Atlantic

Aerial Mail For Columbia

Washington, D. C.—According to information obtained through the legation here, bids for aeroplanes to be used in aerial mail services between Bogota and other points are to be opened on November 2.



The Vickers biplane, wth 300 H.P. Hispano-Sulza engine.

# ALTITUDE LABORATORY FOR THE TESTING OF AERO ENGINES

# By H. C. DICKINSON and H. G. BOUTELL

A Brief Description of the Altitude Laboratory constructed at the Bureau of Standards for the National Advisory Committee on Aeronautics

(Continued from page 123)

# Measurement of Air Flow to Carbureter

Two means have been used to measure the amount of air flowing to the carbureter: a Thomas meter and a venturi tube.

The Thomas meter used was specially built for the altitude

laboratory and consisted of a wooden box 6 inches square on the inside and 16 inches long, which contained a heating grid between two sets of thermocouples. The principle of operation was simply that a given energy put into the heating grid would cause a rise in temperature (measured by the thermocouples) inversely proportional to the mass flow of air.

The heating unit was merely a length of resistance wire strung back and forth across the middle of the box. In practice an E.M.F. of 60 volts was impressed on it, giving current of 2.9 amperes. The thermal element consisted of 20 copperconstantan couples in series, four junctions being encased in each of five stream-lined struts placed in each end of the box.

The four couples were equally spaced down the length of the strut, so that the result of all the couples gave an average for the temperature rise over the whole cross section.

This meter was eventually destroyed in a small fire in the altitude chamber and was then replaced by a large 6-inch venturi with a 3-inch throat. The venturi, however, was cally breated against a second Thomas meter consister any size by brated against a second Thomas meter specially supplied by the Cutler Hammer Co. This meter used resistance ther-mometers in place of the thermocouples and measured the watts input for a constant temperature rise. The connections from the venturi meter are carried to the manometer board.

# Temperature Measurements

The following temperature measurements are made by means of of thermocouples:

Temperature rise oil cooling water. Carbureter air at entrance to venturi meter.

(3) Rise in jacket water temperature.

Jacket water outlet. Exhaust cooling water outlet. Rise in exhaust water temperature.

Chamber temperature.

Oil temperature at engine inlet. Oil temperature at engine outlet.

Carbureter air, taken at the air horn.

(11) Inlet manifold temperature.(12) Gasoline temperature.

The leads from the thermocouples pass through opening 5, see Fig. 2, in the side wall of the altitude chamber to a table on which are mounted the necessary switches and potentiometer, as shown in Fig. 12. The galvanometer is swung in a special cradle mounted on a solid concrete pier to eliminate, so far as possible, the effects of vibration. Considerable diffi-culty was experienced in the early operation of the plant owing to the lack of a proper support for the galvanometer. The vibrations from the engine are transmitted through the ground, so that even the concrete pier was not sufficiently steady, but the present arrangement has done away with this

trouble to a large extent.

The thermocouples are all copper-constantan couples, the junctions being made by twisting the ends of the wires together and soldering with silver solder. The present couples are: an ice junction common to three junctions placed in the oil pipes, an ice junction common to seven junctions used about the carburator and as spares, an ice junction and a junction suspended in the chamber to measure the room temperature, an ice junction and one junction inserted in the carbureter air line above the venturi, an ice junction and two junctions placed in the outlet and inlet jacket water pipes, and outside the chamber, a circuit of three junctions, one in the water main, and two in the exhaust tanks.

All couple wires are wrapped with tape for insulation and to prevent rubbing and to give them body. They are connected with rosin-soldered joints to copper leads passing through the wall of the chamber and brought out to a dial switch with all copper contacts. Before being fastened to the switch, each couple has a small coil of manganin wire connected in series and adjusted to give it an equal resistance to all other couples. The switch has a rotating arm which

carries two copper spring contacts which bear in turn upon the copper contacts to which the couples are attached.

From the arm the circuit is completed through a carefully made manganin resistance of 0.029 ohms, a manganin dial resistance box adjustable in steps of 0.1 ohm to 1,000 ohms, a galvanometer and a key. The 0.029 ohm resistance forms a galvanometer and a key. The 0.029 ohm resistance forms part of a potentiometer circuit consisting of a dry cell, a milliammeter, a double throw switch and a slide wire rheostat.

Another branch circuits is con-trolled by the closing of a doublepole switch, which serves to connect a carefully balanced pair of resistance coils of approximately 85 ohms each, and these together with the dry cell, gal-vanometer, resistance box, and thermal element, forms a Wheatstone bridge.

The potentiometer affords a means of measuring the sensitivity of the galvanometer as follows: Across two terminals of the dial switch a coil is consected having the properties. nected, having the same resistance as the thermal elements but without their thermo-electric property. The arm is placed on these terminals, and the sensitivity is then found by establishing a definite current through the potentiometer (50 milamps) and observing the galvanometer deflection. This has been found subject to variation on account of the heavy machinery in its neighborhood, but can always be brought back to its original value by an adjustment of the inal value by an adjustment of the resistance box.

The Wheatstone bridge serves to compare the resistance of the different couples up to the point of attachment to the dial switch and is sensitive to 0.1 ahm, this being amply sensitive for the purpose.

Thus, from this set up, the E.

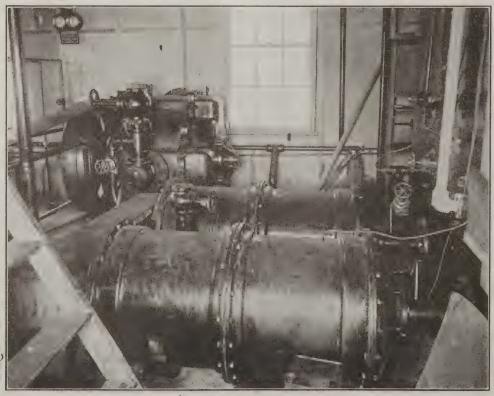


Figure 11. The Exhaust Tanks and the Vacuum Pump

M. F. of any thermocouple may me measured by the current it es-tablishes through the galvanome-ter; and with the bridge and po-tentiometer the conditions of measurement can be made equal for all couples and held constant at all times.

# Fuel Weighing Device

The fuel used by the engine may be measured in either of two ways: by means of an accurately calibrated tank, or by two tanks mounted on platform scales. The mounted on platform scales. The first method gives the volume and the second the weight of fuel used. When using the weighing tanks a test may be run continuously, one tank being filled while the other is emptying, or two fuels may be compared, as follows: One tank is filled with the fuel to be tested and the second with a standard comparison fuel. The engine is run first on the standard fuel and is then changed over to the test fuel, after which a third run is made on the standard fuel. In this way the least possible variation in enthe least possible variation in en-gine condition is involved.

Storage of fuel is provided in undergroundtanks, while the measuring tanks are mounted on a platform placed above and in front of the altitude chamber. The fuel is pumped to these and then flows by gravity to the carbureter. Fuel in the engines tested is kept at the pressure of the chamber by connection through flexible copper tubes.

Miscellaneous Equipment

Suitable pipe connections are provided for obtaining samples of the exhaust gases from the engine, these samples being then analyed in an Orsat apparatus.

A compressed air system for feeding oil to the engine sump and a means for cooling the oil during a test have been and a

installed.

The laboratory is well supplied with tools and the necessary work benches, so that all ordinary small repairs to both the engines and plant may be made without outside assistance.

A device for damping out fluctuation in the city water pressure supplied to the plant forms part of the auxiliary equip.

forms part of the auxiliary equipment.

# General Log of Operation

Work on the Altitude Laboratory, as previously stated, was begun in August. 1917, and the plan was ready for the prelimiplan was ready for the preliminary installation of an engine for test purposes in November of that year. The first engine to be mounted in the chamber was a "Liberty 8," one of the first series of five engines built for experimental purposes. Although this mental purposes. Although this engine was set up in the test chamber in November, there remained many minor items of experimental equipment to be com-pleted and "turned up" before tests could be begun.

Among these were the develop-ment of flexible water-cooled exhaust connections, the completion of air and water piping, the adjustment of the jacket water thermostat and venturi meter, the installation of pressure manometers, gasoline weighing attachments, and temperature measuring devices. The securing of airtightness of the doors and other connections to the chamber, and a multitude of other minor matters too numerous to mention, all took considerable time.

On December 26, 1917, the first

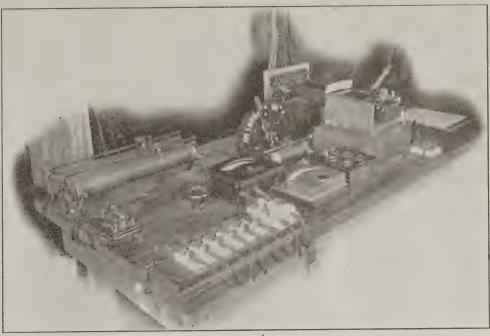


Figure 12. The Thermocouple and the Air Temperature Control Switches

test run was made with the "Liberty 8" engine for the comparison of two grades of fuel, and for data on the contamination and deterioration of lubricating oil.

On January 4, 1918, the first test at reduced pressure was made, the lowest pressure obtained being 44 mm below atmosphere, corresponding to an altitude of about 25,000 feet.

In all, seven tests were run with this first experimental engine, representing about 15 hours actual running time. The records of these first tests show many stops for various records of these first tests show many stops for various causes, most of which were chargeable to difficulties with the engine. This was to be expected, since the 8 cylinder model had not at that time reached a stage of perfection to warrant its use for research purposes. In fact at that time this model had been temporarily abandoned in favor of the 12 cylinder

engine, which was then being perfected.

On January 19, a connecting rod gave way during test
No. 8, and it was decided to abandon the "Liberty 8", then
obsolete, and continue work with an Hispano-Suiza engine

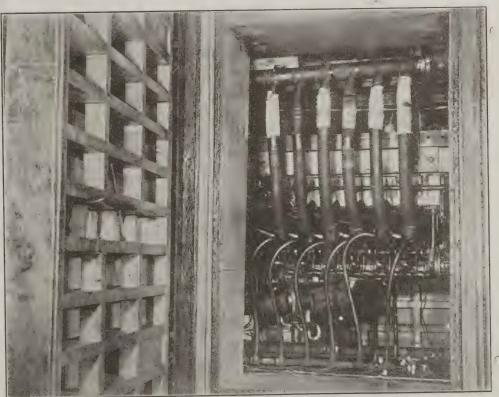


Figure 13. An engine on the test stand in the altiture laboratory

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until the "Liberty 12" was in shape for research on altitude effects.

On January 25, the first experimental run was made with the Hispano-Suiza engine. This test included the first complete set of observations under conditions corresponding to a series of altitudes up to 30,000 feet.

In the year which has elapsed between January 25, 1918, and January 31, 1919, about 150 complete altitude "flights" have been made, comprising only a little less than 1,000 hours of actual engine operation.

Observations have been made with the following models of aircraft engines:

"Liberty 8"

Hispano-Suiza, 150 H.P. Hispano-Suiza, 180 H.P. Hispano-Suiza, 300 H.P. "Liberty 12" 400 H.P.

Of these models, several different engines of the 150 H.P. Hispano-Suiza, 180 H.P. Hispano-Suiza, and "Liberty 12" types have been included,

As mentioned previously, the operation of the "Liberty 12" required the addition of a water brake to the dynamometer, and a number of other modifications in the equipment. These changes were made, and the first series of runs with the "Liberty 12" was begun on October 10, 1918.

# General Nature of Research Undertaken

The problem first presented by the National Advisory Committee for solution by the use of the altitude laboratory, was that of the performance of different grades of gasoline at high altitudes in typical aircraft engines. The Lubrication Division of the Signal Corps requested also the preservation of samples of the lubricating oil to determine the effect of fuel composition and of altitude, on the deterioration of such oils. A staff of two or three men were detailed by the Lubrication Division to assist in securing the desired data.

As different grades of fuel affect engine power and performances only to a very slight extent, the satisfactory solution of this problem required the highest possible accuracy in obtaining complete data on engine performance, as previously outlined. Thus, a practice was established by which all the measurements of power, speed, fuel consumption, barometric pressure, air and water flow, temperature, and pressure, provided for by the apparatus, are customarily made, no matter what is the immediate purpose of the test in hand. The result is, in addition to the data directly desired, an accumulation of valuable supplementary data on engine performance, much of which has not yet been analyzed.

Observations have been made to determine specifically the following relations:

- (1) Horsepower-altitude relation for engines at normal speed.
- (2) Horsepower-speed relation at a range of altitudes up to 20,000 feet.
- (3) Horsepower-compression ratio for normal speed, using compression ratios of 4.7, 5.3, and 6.2 to 1 at a range of altitudes up to 30,000 feet.
- (4) Horsepower-inlet air temperature at a range of speeds and altitudes.
- (5) Effect of variation of intake pressure on horsepower at a range of altitudes, to simulate the effect of supercharging equipment.
- (6) Effect of exhaust back pressure on horsepower, over a limited range of pressures.
- (7) Mechanical losses at various speeds, altitudes, and engine temperatures.
- (8) Metering characteristics of a number of different types of carburator, with and without altitude compensation or control, for the full range of speeds and altitudes.
- (9) Optimum mixture ratios for maximum power over the range of speeds and altitudes, with several different carburators.
- (10) The performance of a number of automatic and hand operated altitude compensation devices for different carburators.
- (11) The total heat distribution for all speeds and air densities at full throttle,
- (12) The performance of special fuels; "Hector", a combination of cyclo-hexane and benzol; "Alco-gas", a combination of alcohol, benzol, gasoline, and other, at a compression ratio of 7.2 to 1.

Other relations have been investigated from time to time. Moreover, the detailed records taken for each test include much information bearing on other characteristics of engine performance, such as, for instance, the behavior of spark plugs and ignition systems under conditions of low air pressure and temperature.

# Appendix The New Dynamometer and Altitude Laboratory

As previously stated, the Altitude Laboratory will soon be housed in a permanent building, which is being erected near the present temporary structure. A floor plan and side elevation of this building are given in Fig. 8. As will be seen from these drawings the building has a rectangular floor plan measuring 50 by 150 feet, and is constructed of brick and concrete in a thoroughly substantial manner.

The altitude chambers, of which there are two, are built at the west end of the building. A central passageway connects the two chambers, with separate doors into the chambers and into the main laboratory. The chambers are identical as to their interior arrangements. The cooling coils are mounted in the upper portion of the chambers and the exhaust is carried to settling tanks in a pit alongside the west wall of the building. The vacuum pumps with their electric motors are placed near these tanks, as shown. In testing a single large engine at high altitudes the doors between the two chambers may be left open, which permits the use of the two vacuum pumps and banks of cooling coils, thus greatly increasing the capacity of the plant.

In connection with one of the chambers two 300 horsepower electric dynamometers and with the other one 400 horsepower dynamometer will be used. The necessary switchboards and the grids for dissipating the electrical energy are clearly shown in the elevation. The foundations of the dynamometers are provided with extension bedplates at the ends opposite the chambers, on which to mount engines for test purposes when it is not necessary to conduct the test at other than ground conditions. When running in this way the couplings between the altitude chambers and the dynamometers can be easily disconnected.

A space is provided in the center of the floor plan for the installation of either a drum or tractor type dynamometer, on which to test motor vehicles and transmission assemblies. The power delivered to the drums or caterpillars may be transmitted by chains to the two electric dynamometers shown in the drawings. Like the ones for the Altitude Laboratory, they are arranged with extension bedplates so that they may be used to test separate engines when requird.

A third dynamometer with a capacity of 50 horsepower is arranged for coupling to any type of small engine or to the drive shaft of a rear axle assembly for test purposes.

The exhaust gases from the different engines, except those in the altitude chambers, will pass to an underground duct, from which they will be withdrawn by an exhaust fan discharging through a pipe in the roof.

For about one-third of its length at the east end the building is divided into a basement, main and mezzanine floors. In the basement is placed the refrigerating plant for the Altitude Laboratory, with space left for other machinery. The north side of this portion of the main floor is occupied by the machine shop, designed to care for all the ordinary repairs to the plant and engines. On the south side are located the office, toilet and wash room, and the tool and store room. The mezzanine floor is divided into two laboratory rooms, which may be used for any of the lighter testing apparatus.

The plant will be equipped with traveling chain hoists for the convenient handling of engines and other apparatus, and with the necessary work benches, etc.

It is planned to have the laboratory in running order this summer.

# THE THIRD PAN AMERICAN AERONAUTIC CONGRESS

WILL BE HELD AT

# HAVANA, CUBA FEBRUARY 21st to MARCH 1st

UNDER THE AUSPICES OF

The Liga Aerea Cubana, The Aero Club of America, The Aerial League of America, La Federacion Aeronautica Pan Americana, and the Aerial Touring Association.

Exposition of World's Best Aircraft. Competitions for over \$25,000 in Prizes. Discussions of Important Phases of Aeronautic Science by World's Leading Authorities.



El Tercer Congreso y Exposition
Aeronautica Pan-Americana

Celebrada bajo los auspicios de la "Liga Aerea de Cuba," el "Aero Club de America," la "Liga Aerea de America," la "Gederacion Aeronautica Pan-Americana," y "Asociacion del Turismo Aero."

Desde el Sabado, Febrero 21 hasta el primero de Marzo ambos inclusives de 1920, en la Habana, Republica de Cuba.

PROGRAMA.

Concursos que se verificaran todos los Dias

1. Concurso de Hidroaeroplanos (eu general).
2. Trofeo y Premios de Curtiss por aviacion maritima.
3. Concurso de Aeroplanos Terrestres.
4. Concurso de Paracidida.

PROGRAMA DIANO

1. Exhibiciones de Paracidida.

PROGRAMA DIANO

1. Exhibiciones, Calenda de Hidroaeroplanos, Aeroplanos, Terrestes, Moloras, Giobos, Dirigibles y Globos Cautinos para compradores.
3. Vistas Cinemalografas y Discursos sobre las fases mas importantes de lo aeronautica.

Los Gobiernos de los Estados Unios, Argentina, Brasil, Bolivia, Chile, Columbia, Costa Rica, Republica Dominicana, Ecuador, Honduras, Haiti, Francana, Gustenda, Abileo, y Nicaragua, asi como los Sociedades Aeronauticana, Deportivas, Sientificas, Industriales y Civicas, de los mismos países, por la presents quedan invitadas para enviar representantes a asistir a este gran concurso aeronautico. Unichos expresentantes a sul legada a la Habana deberan presentarse a la oficina principal del Cemito encargardo de la Convencion Aeronautica, el Tedras Nacional la seccion aeronautica el el Tedras Nacional la seccion apartada para los Juecces durante el concurso, y al "Aerodromo" yestaciones para hidroaeroplanos donde habana exhibiciones de aeronaeva y sus motoras.

Sirvase dirijir todas sus comunicaciones rasta el Febrero 21 proximo venidero, al Sr. Hannibal J. de Mesa, care Royal Bank of Canada, Habana, Cuba.

Troisiene Convention et Exposition
Aeronautique Pan-Americaine

Sous les auspices de la Ligue Aerienne de Cuba, l'Aero
Club of America, The Aerial League of America, la Federacion Aeronautique Pan-Americaine et l'Association du
Tourisme Aerien.

Du Samedi 21 Fevrier, 1920 au Lundi I Mars, inclus. a
HABANA, CUBA

Concours Devant Etre Tenus Chaque Jour. \$25,000 Prix.

1. Councours d'hydravions.
2. Trophee et Prix Curtiss pour Aviation Navale.
3. Councours de Parachutes.
6. Councours de Dirigeables.
6. Councours de Dirigeables.
7. Councours de Parachutes.
8. EPREUVES QUOTIDIENNES.
9. Demonstration et assais d'hydravions et dirigeables, vallons capitis aux acheteurs eveneuels.
9. Transport de passaçars par hydravions et dirigeables, et ascensions en ballons capitis.
9. Representations cinematographiques et conferences sur les phases les plus importantes de aeronautique.
9. Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique.
9. Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique.
9. Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique.
9. Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique supporte des representants pour assister a cette grande convention aeronautique supporte des representants pour assister a cette grande convention aeronautique supporte des representants pour assister a cette grande convention aeronautique supporte des representants pour assister a cette

# Terza Convenzione ed Esposizione Aereonautica Pan-Americana Sotto gli Auspici della Liga Aerea Cubana, dell'Aero Club of America, dell'Aerial League of America, La Federazione Aeronautica Pan-Americana ed the Aerial Touring Association. Dal 34 Febbraio al Primo di Marzo ad HABANA, CUBA PROGRAMMA Gare Che Avranno Luogo Ogni Giorno 1. Gare laroplani (generale). 2. Voli nautici apparecchio tipo Curtiss-Trofei e Preml. 3. Gare Aeroplani di terra. 4. Gare Velocita asocsa e discesa, e manovre di Palloni frenati. 6. Gare Paracadute. AVVENIMENTI QUOTIDIANI 1. Esposizione di Aeroplani, Motori ed accessori. 2. Escroitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili Pallanifremnati. 3. Transporto Aereo passeggeri su Idroplani, e Dirigibili Ascensioni Palloni frenati. 4. Spettacolo cinematografico e discorsi sul elpiu importanti fasi dell'Aeronautica, dell'ordine seguente: Il Governo d'Italia e le organizzazione italiane di Aeronuatica di Sport e di Scienze d'Italia ed l'ialiane all estero sono invitati a mandare rappresentanti ad assistere a questo grande evento acronautico. Arrivando a Habana, Cuba, i Signori Rappresentantii dovranno presentarsi al Quartiere Generale del Comitato al Hotel Plaza, per registrasie ricevere la targhetta ufficiale, nonche il programma. Ogni comunicazione devra essere indirizzata al Signor Hannibal J. de Mesa, Royal Canadian Bank Building, Habana, Cuba.

# BRAZING, WELDING AND SOLDERING IN AEROPLANE CONSTRUCTION

By B. C. BOULTON

Aeroplane Section, McCook Field

(Continued from page 121)

Torch Brasing

This process is well adapted to much small work, such as the brazing of lugs or sockets to larger fittings or main members. Fig. 5 is an illustration of the type of work to which torch brazing is best suited. Such a job is but a moment's work for a skillful operative. The usual oxy-acetylene welding torch shown in Fig. 6 is well adapted to brazing. This type is known as the "positive or medium pressure" torch, and uses acetylene up to 10 pounds pressure and oxygen stepped down from 120 atmospheres to one or two atmospheres. The gases are mixed close to the nozzle instead of at the haft "A," as in the "high pressure" torch. With the latter torch there is considerable danger of back-firing if the tip touches the work or is held too close.

Proper regulation of the welding flame is very important and rather difficult. Fig. 7 is a sketch showing the correct "neutral" flame. It will be observed that the small, intensely white flame "A" is sharp in outline and also symmetrical and smooth. It is this flame, formed by the burning of the oxygen, that furnishes the heat. The larger, less intense flame is produced by the combustion of the hydrogen from the acetylene. In using a torch the first step is to turn on the acetylene until the correct working pressure is registered on the pressure gauge. The acetylene is lighted, and then the oxygen valve slowly opened. As the supply of oxygen becomes nearly sufficient, a long white cone is formed. With an increase of oxygen the cone grows smaller and is sharply defined. This is the neutral flame. A still higher oxygen pressure, with no change in the acetylene pressure, causes the flame to shorten and acquire a violet tint which is characteristic of an excess of oxygen. As the oxygen supply is further increased the cone entirely disappears. Theoretically, for perfect combustion, equal volumes of oxygen and acetylene are required; in practice, with a good torch about 14 per cent. more oxygen than acetylene is necessary. An excess of either gas must be avoided: to much oxygen burns the steel: an excess of acetylene carburizes it. A perfect neutral flame will do neither. Modern torches are equipped with a set of removable tips, graded in size according to the type of work on hand. With too small a tip the heat is radiated or conducted away almost as fast as it is produced; hence the flame has to be held so long in one spot that the metal may be burned. While with too large a tip the radiation may be insufficient to prevent burning the molten metal. For each sized tip the correct oxygen and acetylene pressures are specified by the manufacturer and must be closely adhered to. Never attempt to force a tip by increasing the gas pressure to obtain a larger flame, but use a bigger tip. This general discussion of the oxy-a

One difficulty encountered in both torch brazing and welding is a tendency for the parts to warp. For instance, if a small fitting were being brazed to a fairly large plate near its center, and if the heat were localized, the heated parts would expand, but not the surrounding metal. As a result, the center of the plate would be forced up by the expansion, and on cooling would not return to its original form. Sometimes this is a serious matter. However, it can be largely avoided by heating the plate over an entire section through the part being brazed. This allows expansion of the whole part in one direction. One of the main advantages of open-furnace brazing is that all the parts are raised to nearly an even temperature and consequently there is very little difficulty with warping.

For both torch and open-furnace brazing the spelter is used in the form of rods, as in welding. Their size depends on the character of the work.

It is usual in torch and open-furnace brazing to smear the parts to be brazed with a layer of flux in the form of a paste before they are riveted or spot-welded together. Then during the brazing operation, more flux is added. With neither of these types of brazing is there as much certainty that the flux will reach every portion of the joint as in dip brazing. Therefore this precaution of previously coating the metal is very advisable. Open Furnace Brasing

The heat that is required for either brazing or welding must be not only sufficient in intensity, but also adequate in amount. A careful distinction should be drawn between these two factors. The flame of the oxy-acetylene torch produces a temperature of 6300° F., and yet the actual amount of heat may be very small. On the other hand, a large air-gas torch provides an abundance of heat but it may not be concentrated enough, that is of sufficient intensity, to melt the brazing or steel. The temperature of the applied heat must always be

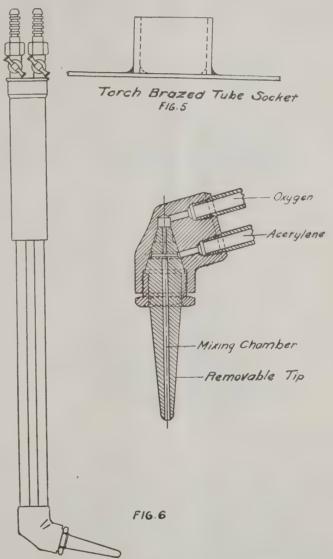


Fig. 5. An Example of Torch Brazing. Fig. 6. Brazing or Welding Torch.

considerably above the melting point of the materials to be fused, and its amount must be ample to quickly raise the parts to the desired temperature, after deducting the losses from radiation and conduction. With a dip brazing furnace both of these conditions are easily met. However, in brazing or welding with an oxy-acetylene torch difficulty is often experienced in securing an adequate amount of heat, and in brazing in the open with a gas torch, in obtaining the necessary intensity. The principle employed in the old open-turnace for brazing prevents much of the heat loss and permits of a more effective concentration of the flame.

A modern brazing forge is shown in Fig. 8. The heat is furnished by the combustion of air and illuminating gas, each supplied under a moderate pressure. By means of stop-cocks

both the air and gas flow can be regulated. As illustrated in the cut, two movable swivel torches are generally used. concentration of both burners on the work shortens the time required for the heating. The chief difference between ordinary torch and open-furnace brazing is that with the latter method the heat, instead of being dissipated, is radiated back from the sides of the furnace. The entire fitting or member in the furnace is evenly heated to perhaps a red or cherry heat, and the surfaces to be brazed to the required 1650° or 1750°. The warping, due to expansion, that was discussed under torch brazing is thus eliminated. Table I, giving the colors of steel for various temperatures, is of assistance in determining the temperature of the metal in either torch or open-furnace brazing where a thermometer cannot be used. concentration of both burners on the work shortens the time determining the temperature of the metal in either torch or open-furnace brazing where a thermometer cannot be used. For special or unusually large work it may be necessary to build up a furnace of fire brick. This is frequently open only at the front. It should be no bigger than needed to accommodate the work. For such a furnace a large air-gas torch, constructed of ordinary gas piping like the one in Fig. 9, may be used. It operates on the injector principle. The flame is a Bunsen flame with a blue cone. So far as is possible, the yellow or reducing part of the flame should be used. A burner of this type is easily regulated, and the flame may be readily directed where desired. Either one or two torches would be used.

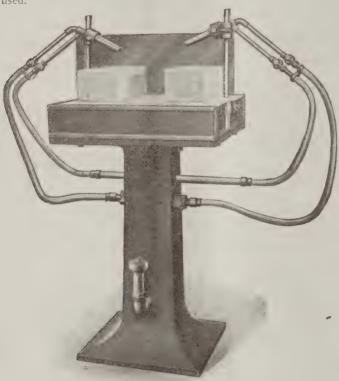


Fig. 8. Open-Furnace Brazing Forge.

There is probably even greater economy in preheating parts

that are to be brazed in an open furnace than in a dipping furnace. A large amount of time and gas is saved.

In comparing the relative merits of the three methods of brazing, it may be said that dip brazing is in general the simplest, cheapest, and most dependable. Much less skill and experience is required to secure as satisfactory results with this process. It is probable that the joint is stronger, and that the steel is left in better condition than with the other two methods, which are more special in their nature. Yet often it is very inconvenient, if not impossible, to dip braze. In such cases, either the torch or open-furnace processes, with reasonably careful workmanship, should be entirely reliable.

Welding

The status of welding in aeroplane work is rather unsettled. In Europe, and particularly in Germany, welding has been in very extensive use. What are considered the most difficult very extensive use. What are considered the most difficult and uncertain types of welds, such as the direct uniting of several mitered tubes, were common. Just what proportion of accidents occurred as a result of faulty welds is difficult to say. It is generally conceded that European welders are more skillful than our American workmen. In any case, for the special work found on aeroplanes, welding is not strongly advocated in this country. In England also, the trend of opinion, as is indicated by a quotation from Mr. Hackett's

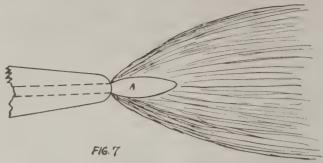


Fig. 7. Neutral Flame for Welding and Brazing.

paper, does not favor welding. "Such a method as welding tube to tube by mitering has dropped out of favor, having been superseded by the more costly but better and safer engineering practice of joining by means of machined or built-up tubular sockets. Welding, by whatever means it is done, is always open to a certain amount of doubt, and though there are innumerable cases where this doubt as to the strength of the initial groundless were expensed to the bridge partners of the the joint is groundless, yet, owing to the hidden nature of the defects of welding and the possibility of burning and oxidation, present-day designers avoid it in any important member of aircraft structures. Yet there are certain cases where welding may be advantageous. At least, the limitations of this process should be clearly understood.

At the present time when parts that are to be joined must undergo a severe subsequent heat-treatment to secure a strength ranging from 80,000 to 200,000 pounds per square inch, welding is the only process that can ordinarily be used. Where members are required to have such high strength it would be unwise to weld at a critical section, such as near the center of a hear or compression strut. However, if the weld center of a beam or compression strut. However, if the weld occurs at a section that is not highly stressed, a partial decarburization of the steel will probably not be serious, and the heat-treatment following the welding will restore the strength of the rest of the member, which is very liable to be greatly lowered by the heat from the welded portion. Only too frequently designers have specified that fittings should be welded as a rain resember made of heat treated allow steel and have to a main member made of heat-treated alloy steel, and have neglected to provide also for subsequent heat-treatment. neglected to provide also for subsequent near-treatment. As a result, in test the member would fail at a stress of perhaps 75,000 pounds per square inch instead of the 150,000 pounds per square inch for which it may have been calculated. As an example of this might be taken the case of a heat-treated torque tube to which strap hinges had been welded after the heat-treatment. There are, of course, many instances in which soldering and brazing may be used as alternatives to welding, and in such cases the relative merits of the different processes should be carefully considered. should be carefully considered.

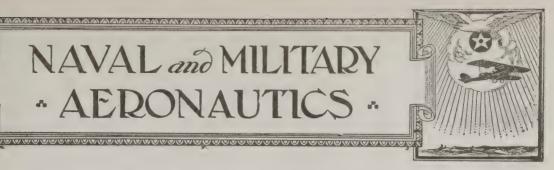
F1G. 9

Fig. 9. Large, Open-Furnace Brazing Torch.

(To be continued)



# NAVAL and MILITAI · AERONAUTICS



Balloon and Airship Service Being Strengthened

Washington, D. C.—In order to complete the enlisted strength of balloon companies, Lieut.-Colonel J. D. Carmody and Captain Ayling are now visiting heavier-than-air stations inviting volunteers to transfer to balloon stations. There are still needed about 800 to complete the complement of 32 balloon and airship companies.

The three Mullion type airships and the three demountable airship hangars which were purchased from the Royal Air Force last January have Royal Air Force last January have just arrived in the United States. It is estimated that the large airship shed at Langley Field will be completed in about two weeks. The steel airship shed at El Paso has been somewhat delayed through non-arrival of steel; the foundations have been completed.

Colonel James Prentice has been

Colonel James Prentice has been appointed a member of the Board consisting of Artillery and Air Service Officers for the purpose of conducting experiments and determining the best means of communication be-tween aircraft and artillery; this will be in addition to the present duties of Col. Prentice in establishing the Mexican Border airship stations.

Cooperstown Military Hospital For Air Service Officers Discontinued

Washington, D. C .- Officers of the Air Service will regret to learn the hospital at Cooperstown, New York, will be closed on or about October 15, 1919. This hospital was leased to the Government by the Charle estates. Cooperstown, New Clark estates, Cooperstown, New York, for a dollar a year, and was limited to the use of aviators who required rest and treatment because of nervous breakdown or allied troubles,

resulting from crashes or long continued stress.

About ninety-eight per cent of the cases treated were officers who had The results returned from overseas. obtained in the treatment were most remarkable, 327 out of 335 patients having been returned to duty cured.

It has become necessary to close this hospital since all overseas patients have been disposed of, and because there are not enough patients of this class belonging to the Air Service to warrant the continuance of the

It is hoped that a hospital of this kind will be established for the Army at large. There has always been a great need for such an institution for the treatment of officers of the service whose nervous system had been racked by strenuous duties or other causes. When the records made at Cooperstown are appreciated it is believed that the hope for the establishment of such a hospital will be realized.

More Credit Toward Silver

Chevrons After October 4
Washington, D. C.—The War Department authorizes publication of the following information: The Secretary of War directs that service rendered in the Army after October 1919, will not be counted toward the acquirement of service chevrons, gold or silver, except that rendered in the American Expeditionary Forces in Siberia and with American troops.

Aviation Section Signal Corps Officers to Wear Air Service Insignia

Washington, D. C .- According an announcement issued by the War Department, the Secretary of War directs that officers of the Aviation Section Reserve Corps, shall wear the insignia of the Air Service and not that of the Signal Corps.

Reserve officers not on active duty may wear the uniform of their corps and rank on occasions of military ceremony, on public holidays such as Decoration Day, etc., and when engaged in the military instruction of, or when responsible for the military discipline of a cadet corps at an educational institution. The proper collar insignia "U. C." with super-imposed "R" in gilt must then be worn.

Any person who served in the present war may wear their uniform after discharge, provided the red discharge chevron be worn as a distinguishing

# King Albert Decorates Ensigns Lamb and Carter

New York, N. Y.—The officers and crew of the F-5 flying boat, in which King Albert made a flight over New York City on October 4, received the Order of Leopold II from the King through Lieutenant Commander Hasler.

Ensign Paul W. Carter and Ensign Frank Lamb each received the medals of a Chevalier of Leopold II, and W. L. Carleton and W. E. Smith, me-chanics, received medals of Leoreceived medals of chanics, pold II.

# No Civilian Flying Permitted in Canal Zone

Washington, D. C .- As the prohibition against civilian fliers, operating over fortified areas still is in force the commandant of the Panama Canal Zone was instructed by the War Department that none except army or navy aircraft be permitted to fly over the Canal Zone.



The De Marcay biplane with 300 H.P. Hispano-Suiza engine, which was being put into production in France when the armistic was signed



# NEWS FOREIGN



Cardiff Merchants' Air Service Connects London Offices With France, Belgium and Italy

London.—One of the first business houses in the world to London.—One of the first business houses in the world to employ an aeroplane of its own as part of its regular organization is hat of S. Instone & Co., steamship owners and general export and import merchants, of Cardiff. The firm has purchased from the Air Ministry one of the largest machines, and has engaged as pilot Lieut F. L. Barnard.

Mr. Samuel Instone, in an interview, said serious delays

had occurred during the last three months in the transport of imporant papers, samples, and ligh goods, and so the firm had decided to start their own service of express communication between the London office and the offices in France (Paris), Belgium, and Ialy. Besides sending over office papers, they intend to use the aeroplane to enable heads of departments to get into touch quickly with foreign buyers. If the experiment proved a success, Mr. Instone said, the firm would acquire a fleet of aeroplanes, and they might also go in largely for airships for commercial pur-

Huge Aviatik Carries 18 Pessengers and Crew of Six

Berlin.—Preliminary tests of a new Aviatik passenger carrier are said to be successful. The dimensions of the machine are approximately 130 ft. in span, 73 ft. in length, and 0 ft. in height. It is fitted with two 500 h.p. and two 50 h.p. Benz engines, and is capable of carrying, hesides the commander two navigators two mechanics. besides the commander, two navigators, two mechanics, one steward, and 18 passengers with luggage.

# Savioa Seaplane Makes Non-Stop Flight From Lake Maggiore to Amsterdam

Amsterdam.—A fine performance by a Savoia seaplane was made on September 8, when Petty Officer Guarnieri, of the Royal Italian Navy, left Lake Maggiore with Lieut. Campacci, R.I.N., on board one of these machines and made a non-stop flight to Amsterdam. After flying over the Alpine chain of the St. Gothard region, and crossing Switzerland from south to north, Guarnieri followed the Rhine valley.

# London Times Uses Aeroplane Transport For Late Paris Advertising

London, Eng.—The following advertisement appeared in

the London Times:
"Small Advertisements by Aeroplane. With the view of facilitating the insertion of urgent advertisements from readers of The Times in France, arrangements have been made whereby they will be delivered in London by aeroplane daily.

"All advertisements received at the Bureau du Times, 2, Chaussée d'Antin, Paris, up to 9.30 a.m. each day will be in time for the following day's issue of The Times."

# American Volunteers Report at Polish Headquarters

Warsaw.—Ten American aviators, members of the "Kosciusko squadron" recruited at Paris under Capt. Merian Cooper, have reported to Polish general headquarters for incorporation in the Polish army.

# Lacointe Flies Three Miles in Minute

Paris.—Sadie Lacointe is the first man who ever traveled three miles in one minute. Lacointe, who was official tester for French aeroplanes during the war, covered the three miles in a new type Monocoque at an altitude of 2,000

feet this morning.

Lacointe will pilot the world's largest aeroplane upon its trial trip. The giant machine has 175 feet wing spread and a length of 60 feet. The entire fuselage is a cabin. The tail, to which the rudder is attached, has a cupola where machine gups could be placed.

where machine guns could be placed.

A speed of 10 miles an hour is expected to be attained. The giant machine has a cruising radius of 500 miles.

# Twenty-four Passenger Italian Plane Reaches Lille

Paris.—An Italian aerobus carrying twenty-four passengers arrived at Lille on its way to Amsterdam from Italy.

Bi-Weekly Berlin-Stockholm Service Starts

Stockholm.—A Berlin-Stockholm service was inaugurated on October 8. The dirigible Bodensee left Berlin at 5 A. M. and reached Stockholm at 12:30 P. M. The service is to be bi-weekly, twenty-five passengers being carried on each trip at a fare of 400 kroner.

Non-Stop Flight From Rome to Warsaw

Rome.—According to a report published in The Aeroplane, Lieut. Ancilotto, piloting an S. V. A., made a nonstop flight from Warsaw to Rome at an average speed of 122 miles an hour.

\$80,000,000 Subscribed For Airport Near The Hague

The Hague.—The sum of \$80,000,000 has been subscribed towards the establishment of an aerial port at Ockenburg, near the Hague, according to the Daily Express.

Thirty Scandinavian Companies Combine in Issue of **Aviation Insurance** 

Christiania.—A congress of insurance companies to discuss aircraft accident insurance was held here recently. Fourteen Danish, nine Swedish, four Finnish and four Norwegian companeis were represented.

Rome-Neples Dirigible Service

Rome.—To the end of esatblishing the dirigible as a means of transporattion, Admiral Pietro Orsini, Inspector of Maritime Aeronautics in Italy, has reconstructed the nacelle of the dirigible M-1 into a comfortable passenger car. This is accomplished by building it into two stages, each fitted with the usual wicker arm chairs beside the big windows which enclose the car. The three engines, as well as the oil and gasoline tanks, are fitted to the rear of the car. The M-1 itself is the well-known semi-rigid Crocthe car. The M-1 itself is the well-known semi-rigid Croc-cotype of a 12,000 cubic metre capacity. Regular passer-ger service is now run between Rome and Naples for the moderate fare of 100 francs, and all proceeds of the ven-ture are turned over to he support of the orphans of the Italian sailors.

Anglo-Argentine Aviation Company Formed

Buenos Ayres.—Major S. G. Kingsley, of the Aircraft Manufacturing Company, has formed the Anglo-Argentine Aviation Company for the distribution of D H machines. Major Kingsley has established several records since his arrival.

# Toulouse-Casablanca Service Started

Paris.—The "Compagnie Francaise France-Maroc" has secured permission to operate a service from France to Morocco via Spain, the Spanish Government having withdrawn its objections.

The first machine of the intended regular service left Toluouse on September 1, and reached Barcelona 150 miles) in 105 minutes. From Barcelona the aeroplane flew to Alicante (270 miles), where the mails were transferred to another machine for conveyance across the Mediterranean to Casablanca, on the west coast of Morocco (550

There will be branch lines to Rabat (also on the Atlantic

coast of Morocco), and to Oran in Algeria.

Passengers or mails will leave Paris by the night train for Toulouse, and proceed thence by aeroplane, reaching Rabat in about 16 hours' flying from Toulouse, thus bringing Rabat within two days' journey of Paris. Regular passenger service was scheduled to start October 1st.

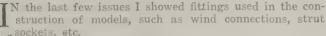
# Lecointe Wins Coupe H Deutsch

Paris.—By averaging 155% miles an hour for 125 miles (200 kilometers) in a Spad-Herbemont, fitted with a 300 h.p. Hispano-Suiza engine, Sadi Lecointe on September 2 won the Coupé H. Deutsch. The course from St. Germain, over Senlis, Meaux and Melin, was covered in 48 minutes 8 seconds. In order to win the cup the next competitor must average 171 1-3 miles an hour, as the winner must fly 10 per cent. faster than his predecessor.



# ELEMENTARY AERONAUTICS

# MODEL NOTES By John F. McMahon



The present articles will treat on fittings used in man carrying aeroplanes of the light type. The reason for selecting the light type aeroplane is because of its low cost of building, which is important to readers of this page. The person who can afford to buy an aeroplane does not need to know the why and wherefore of different fittings. This information is simply for those who cannot afford purchase a large machine, but who think enough of their ability to build one.

Of course a complete machine purchased from a reliable firm is a better investment than a home-made one in most cases, but the home-made one is a happy medium between a "real" one with all the frills and fine looks of a manufac-

tured article and not having one at all.

Any man or boy can build one with a little money and a little patience. Years ago it cost hundreds of dollars to build even the simplest aeroplane, but to-day, thanks to the many aeroplane supply houses, well-made parts can be pur-chased for very little money. The result is that anyone can have an aeroplane by doing a little work (the assembling) and buying parts as needed, which makes the purchasing

much easier.

I have been asked many times about the space needed, or the size of work shop necessary to build an aeroplane. It might be of interest to the readers to hear that the writer completed a 28 foot spread tracor biplane weighing 450 lbs. complete in he cellar of my house. The available space to work was 10x20 feet. It must be remembered that the present aeroplane can be dissembled and can be taken through a small opening, for instance, a doorway. This permits the use of a room, barn, or, in fact, any place where there is room to drill a hole or use a pair of pincers. The cost of a man-carrying aeroplane varies with the style of machine. One patterned after the "Crow," which is an English production of the parasol ype, using a two-cylinder A. B. C. engine and a nacelle suspended beneath the planes, to house the aviator, could be built for less than \$100, less the motor. One patterned after he Ford motored aeroplane which was described in past issues of AERIAL AGE, which was built by the writer for \$175, less the motor. A real large one could be built for less than \$500.

Of course, it must be remembered that this is for the rough, unfinished material. If finished parts are needed they can be purchased from aeroplane supply houses adver-tised in the AERIAL AGE.

The wood for construction of light weight machines

The wood for construction of light weight machines varies according to the place of use, as follows:

Ash or oak is used for landing chassis struts, etc., spruce fir or ash, for body longerons. Some manufacturers use spruce to the rear and ash in the forward part where the pilot and engine is placed. Wing beams can be made of spruces, ash or fir. Rib battens should be made of spruce, or, if of ash, they should be made of smaller dimensions to save weight. Rib webs can be made of three ply veneer, save weight. Rib webs can be made of three ply veneer, spruce, white pine or white wood. The veneer web will be found th best for weight and strength.

Common sense is the main thing in aeroplane design and construction. Many good inventors, young men who would do things, would be beter off, if they would but try something on their own hook and follow general practice only when it is necessary. Different forms of aeroplane fitings can be worked out to save work or metal and still be

just as efficient.

Some fittings are shown in the accompanying cut. are used on the machines sold by the Chicago Aero Works. Figure 1 is a light fuselage fitting and is used as a terminal for the body struts and bracing wires. It is made of sheet steel plate lightened and bent at a right angle, and a right angle bolt.

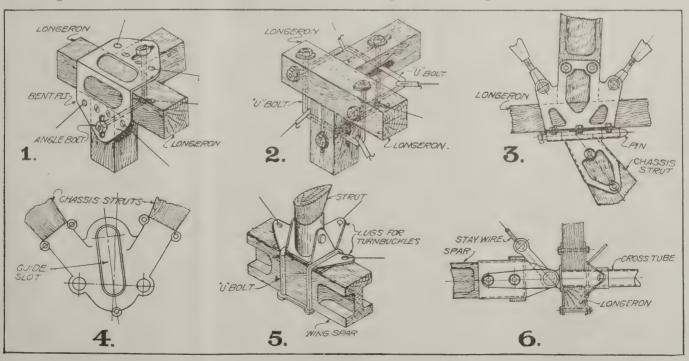
Figure 2 is a Bleriot fitting and is made up of three "U" bolts. This fitting does away with the use of urn buckles on the bracing wires and is cheap to make up. However, it is not in common use to-day owing to the necessity of piercing the longeron four times at each strut station, which would weaken he member.

Figure 3 is an axle guide plate used at the apex of the "V' 'struts. The axle moves up and down in the large slot. The struts simply slipping into the socket shaped portions

provided.

Figure 5 is a simple and light strut fitting. It is shown fastened to the wing spar and a portion of the strut in place. Two "U" bolts fasten the fitting to the spar.

Figure 6 is a wing connection fitting and body compression strut as well. It is an anchorage for the wing spar as well as a compression brace for the body. It is also an anchorage for the bracing cables.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

A sea gull spanned the azure sky, It saw an aeroplane fly by,
"This thing so swift, what can it be That somewhat doth resemble me?'

A pistol shot was heard in air. The sea-gull cried—"take care! take care!" Then hurrying, turned disdainfully-"Would you destroy your pattern—me?"
Florence Tucker Osmun.

A little volume of poems by Flight Commander Jeffery Day has been published in England, which convey the impressions of his first flight. Day won the D. S. C. at the age of 22, and was kiled in an aerial combat with six German planes.

In the clouds:—
"The wing-tips, faint and dripping, dimly show Blurred by the wreaths of mist that intervene; Weird, half-seen shadows flicker to and fro Across the pallid fog-bank's blinding screen."

"Then engine stops: a pleasant silence reigns—Silence, not broken, but intensified
By the soft, sleepy wire's insistent strains,
That rise and fall, as with a sweeping glide
I slither down the well-oiled slides of space
Towards a lower, less enchanted place."

Nor does he fail in his gallant attempt to convey in metre the illusion of actual flight:-



Before very long you will be teaching your wife to run the family aeroplane.—Fontaine Fox in the N. Y. Globe.

"My turning wing inclines towards the ground; The ground itself glides up with graceful swing, And at the plane's far tip twirls slowly round, Then drops from sight again beneath the wing To slip away serenely as before,

A cubist-patterned carpet on the floor. "Hills gently sink and valleys gently fill; The flattened fields grow infinitely small; Slowly they pass beneath, and slower still, Until they hardly seem to move at all."

On April 27, 1882, some one mailed a letter from the Ebbitt House in Washington to Colonel Charles E. Sherman, then staying at the Metropolitan Hotel, a few blocks man, then staying at the Metropolitan Hotel, a few blocks away. On September 8, 1919, the letter was returned to the New Ebbitt Hotel, undelivered. Fifteen postmasters have come and gone while that letter has been looking for its addressee. If Colonel Sherman will now claim his letter he may find that it invited him to the theatre thirty-seven years ago .- American Legion Weekly.

"Hello, Jack, heard you just became the father of a bouncing boy. What are you going to name him?"
"I'm going to call him 'Weather-strip.'"
"What an odd name! Why choose that?"

"Because he kept me out of the draft."-American Legion Weekly.

Lady, looking for the perfect maid servant, would be glad of the use of an aeroplane for a day, as she is convinced what she requires cannot be found on earth.-Aircraft.

"It says, 'Asbestos' on the curtain. Is that a stove ad?"
Overseas Veteran (without embarrassment)—"Why,
no; that's French for 'good night.'"—Froth.

Jem-"Why wno't they allow you to take up women in

aeroplanes?"

Jim—"Too many of the pilots went blind while they were flying upside down."—Chaparral.

"There's only one way of making aviation safe and that

is to tie borax on the bottom of the plane."
"Well, your original, anyway. What happens next?" "If you fall into the ocean you'll land in soft water." -Froth.

The famous French airman Georges Dombrival has utilized the well-known instinct which scientists have long observed is possessed by snails, according to the Detroit News. For some unknown reason, a snail when placed on an inclined plane crawls toward the highest part

When M. Dombrival was informed of this he placed on the upper plane of his Maurice-Farman machine eighty-eight pounds of snails, two-thirds of which were the large, slow snails of Bourgogne, beloved by epicures, the remainder a smaller and more agile variety. After rising to about 1,500 feet he was able to take his hands off the controls for the rest of his two hours' flight. The snails moved in a mass toward the upper part and re-established the equilibrium whenever the machine dipped, either laterally or longitudinally, thus keeping the airplane in perfect line of flight.



# Around the World in a Week

by

Edgar H. Felix, A. I. R. E.



(Note.—The first flight around the world is a feat which will be performed in the not distant future. In fact, the developments in aeronautics have been so amazingly rapid that aircraft which measure up to the requirements of this exacting task can even now be constructed from the engineering knowledge and experience already accumulated. It is more a problem of selection, not only of features of design, construction, equipment and supplies, but of personal equipment and comforts, so that the human element, the pilots, shall be able to endure the strain which the prolonged journey will impose.)

Poor Jules Verne! Only forty-six years ago he was discredited and ridiculed by men of science,—some even said he was crazy, and all because he seriously asserted that his novels were prophesies—that travelling under the sea and making a trip around the world in eighty days would some day be possible.

His prophecies are now realities. If living today, he would proclaim: "Before twenty years pass, we shall fly around the world in a week."

Such a trip will not, of course, be a non-stop flight. Lieutenant Maynard in the 5,400 mile transcontinental flight made at least twenty stops in each direction for supplies and repairs. So also in flying around the world the aviator will stop at many flying stations.

With machines of greater endurance and greater speed now planned and building and with a network of supply stations established over the surface of the earth, the trip can and will be maed within a generation.

However, before any aviator attempts such a trip, certain parts of the machines of the present must be changed; new designs adopted and different materials used. New appliances of safety and communication must also be added to our present airplane equipment.

One great obstacle to be overcome is the present deficiency in the equipment of the aviator himself; for, with the supercharger and the variable pitch propeller of the near future, much greater speed may be attained at greater heights, if the aviator can be kept warm at such altitudes.

The problem of keeping the aviator's hands normally warm so that he shall not risk losing control of his machine and so that he can keep continually in touch with the earth by radio—is one of the big problems.

It is a big problem because his hands cannot be kept wrapped up in furs as can his body. The hands must

be free to move; the fingers must be so free that they can be used in adjusting parts or in operating a radio call for help or for weather information.

Long distance aerial flights of the future will depend upon steering clear of air storms and this in turn will depend upon frequent communication between the airplane and the meteorological stations established along the routes of the aviators' 1,000 and ,000 mile flights.

This brings us to a very human problem, for the improvements necessary to make an around-the-world trip possible do not depend so much upon knowledge of what is needed as upon proper and exact selection of material and equipment.

This is a human problem because the selection of anything depends upon the judgment of the human mind that selects it—whether it be the selection of new materials for special airplane parts or the cloth for a suit of clothes.

In one way, the whole problem of the future in the air depends upon the ability of the human being to make selection without mistake. Theories and information are of little value in selection. The best informed man and the greatest scientists are often "taken in," although few of them wish to admit it.

Of course, it's not agreeable to be forced to remember the times we've been "taken in" in selecting—let us say—"non-leaking" fountain pens, "all-silk" shirts, and other "guaranteed" things. But even though it's disagreeable, it's interesting to know HOW we've been "taken in."

On analysis, I find that every time I've been "taken in" it has been due to the *general* appearance of the thing, or to somebody's "say-so."

So, also, I know that never in my life have a been "taken in" when I selected a thing by the tests of my own senses. My senses can withstand all the sales talk and all the guarantees in the world.

Even though the girl at the coffee counter assures me that the coffee mixture is a fresh fifty-fifty Mocha and Java, I now know enough to let it alone if my sense of smell tells me its odor is that of stale chicory and chemically treated spices.

And even though the haberdasher assures me that the shirt he is trying to sell me is "pure" silk, I know enough not to buy it, if the *tactile sense* of my fingers tells me it is rough as cotton and if my *sense* of pressure tells me the fibres are as hard as pig bristles.

The test of the senses is certain. In fact, using the senses is the only certain way of making a correct and exact selection of anything in the world.

With past experience in mind—and experiences of buying non-leaking fountain pens and the happier memories of wise choices of good tobacco and soft felt slippers, I set out to select a pair of aviator's gloves. I wanted the best, and only the best, aviator's gloves made.

From the gloves on the market I was determined to select only that make which would stand the tests of my own senses—the only certain test—and I was equally determined not to accept any aviator's gloves of any make on anybody's say-so or anyone's guarantee, unless it did come up to my sense tests.

I tested gloves for comfort and warmth, for freedom of movement, for adaptability in meeting all needs and uses and for wear and durability. I tested them under all possible conditions. I tested them by as many senses as possible.

Psychologists and physiologists now tell us there are twelve special senses instead of the limited five known when you and I went to school. Of course, the more senses used, the more certain the test; although it is seldom that more than two or three of the twelve senses can be used in testing any one article. To my surprise, however, I found that the gloves I finally selected stood the test of eight different special senses and twenty-one different sense tests!

The gloves I selected fitted well and were of good form,—my senses of motion and direction told me that. Besides those that fitted me I saw sizes ranging from  $7\frac{1}{2}$  to 12.

The colors—khaki, tan and mahogany—were good—there was no doubting that, my sense of color *proved* it. I gripped them gently in my hands and my sense of pressure told me that Cape Leather—of which they were made—is pliable and flexible. That means air

My sense of pressure also told me that the special knitted wool with which they are lined is porous and elastic—more air spaces and more protection from the cold.

spaces, and air spaces mean warmth.

Moreover, this same sense told me that the extra interlining of a soft chamois was the softest chamois known—more air spaces and increased warmth.

Though the linings perfectly fitted the outside leathers, I found the one free of the other, which means a layer of air between—more protection against cold.

These tests of the senses—the only certain means of preventing you from being "taken in"—proved the gloves to be the warmest gloves made.

Then I tested them for freedom of movement. Already my pressure sense had told me that Cape Leather—though strong—was as pliable as silk and as soft to the touch as a woman's hand.

Every line of the cut of the leather and every line of the form of the finished glove—proved the glove could

not be clumsy. The movements of my own hand, of my thumbs and of each individual finger added to this proof.

And the pouch of these gloves—the Centemeri Gloves—is the invention of a genius. With the greatest ease I slipped it on and off—freeing my fingers for use or re-inserting them in this wool lined pouch to keep them warm. Later I found that I could slip this pouch on and off while in the air just as easily as I can turn the leaf of a book when reading at home.

Such freedom of movement; I can easily slip all four fingers from the pouch—or one at a time—to operate the radio, to exactly correct the altimeter, to accurately make the finest adjustments; and yet, within a minute, I can slip my fingers back into the pouch of knitted wool that keeps the hand and fingers warm at the highest altitudes. And all this without taking my hands from the control.

Useful? These gloves stand every known test for comfort, warmth, and freedom and ease of movement.

Next, the sense tests for durability. I found them made of Cape Leather—the finest quality of durable leather, smooth to the tactile sense! soft and strong to the pressure sense; so rip-proof was every seam that it defied all my stretching and pulling. I now know that this leather and this sewing also withstands the test of time—whether I use the gloves piloting an airplane of driving an automobile.

It was by these tests I selected the one satisfactory aviator's glove—the Centemeri "Pouch" Aviation Glove. It was by these tests of the senses that I was again saved from being "taken in."

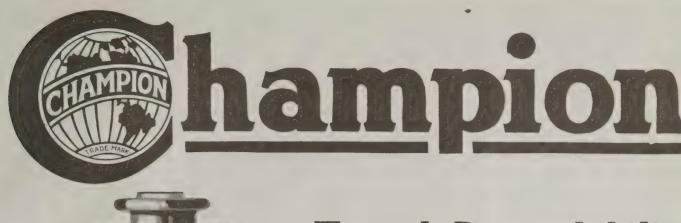
Never buy anything on anyone's say-so or anybody's guarantee unless the article also itself stands the tests of your own senses. These are the only safe tests in the world. And the more senses you use, the better.

Remember, these gloves stood the test of eight different sense tests—the greatest number I have ever known to be applied in the selection of any one article!

But, I have since discovered that these gloves have stood the test of time. Thousands of them were used by aviators fighting the Germans on the western front. There are thousands of service stars to the credit of these Centemeri Gloves—additional time-test evidence of the wisdom of my selection.

Moreover, I have lately discovered that the Centemeri "Pouch" Aviation Gloves have stood the tests of men in many lines—not only for the aviator at the "stick" of his airplane and the chauffeur at the wheel of his car,—but of the locomotive engineer, the driver of the army truck, the automobile racer, the civil engineer, the surveyor, of those who skate, toboggan and ski. In fact, everyone who works or plays in the cold—everyone whose hands and fingers must be kept warm, yet ready for instant use—chooses the Centemeri Aviator's "Pouch" Gloves as soon as he knows of them.

Thus the Centemeri Glove 1) by sense tests, (2) by time tests, and (3) by tests of men in many lines, is proved the strongest and softest, the warmest and most comfortable, the most durable and the most usable glove made.—Adv.





Look at the insulator. Nearly always it is a "Champion" that is identified with the even hum of a well tuned motor. For Champion Dependable Plugs deliver a sure spark that makes smooth running motors. And flyers prefer to rely on "Champion".

Champion dependability is tested. The "Air Test" shows no leak and the "Shock Test" establishes durability under shocks and vibration.

Experts, long trained, give close inspection to every detail of the manufacture and no plug leaves the factory without final assurance of perfection.

This care and thoroughness, coupled with our famous No. 3450 Champion Insulator and patented Asbestos Gasket, are responsible for the better performance of Champion Spark Plugs. They resist greater heat changes and stand more vibration.

There is no substitute for Champion dependability. Make sure that the name Champion is on the insulator as well as on the box.

CHAMPION SPARK PLUG CO., Ohio. Toledo.



(Continued from page 156.)

liminary to the luncheon given in their honor at the Chamber of Commerce.

The luncheon was a public one and was attended by over three hundred members of the Chamber of Commerce and

other leading commercial organizations.

Mr. Charles Ocumpaugh, who presided, gave an interesting talk on aviation, showing its progress from early in the 15th century to the present day. Mr. Howard Strong, Secretary of he Chamber of Commerce, told of the interest of the Chamber in aeronautics from a commercial and progressive standpoint and predicted a great future

Mr. Hawley, Commodore Beaumont, Major Glidden and Mr. Woodland all spoke, explaining the purposes of the First Aerial Derby Around the World, and asking the co-operation of the city and civic bodies in making a success of this enochmaking event and their request was cess of this epoch-making event, and their request was promptly responded to by a pledge of co-operation from the Chamber of Commerce, the Aero Club of Rochester, and other civic bodies and sporting organizations.

and other civic bodies and sporting organizations.

The Commission left the same afternoon for Buffalo, New York, where it arrived the same evening and was tendered a banquet at the Buffalo Club, which was attended by about 50 of the most prominent business men and organization heads of the city.

In the absence of Mayor Buck of Buffalo, City Commissioner Fred. G. Bagley spoke on behalf of the city and was most enthusiastic over what he termed "the most worthy and progressive movement of the age," and pledged the hearty support and co-operation of the City of Buffalo

the hearty support and co-operation of the City of Buffalo owards furthering the interests of the Derby.

Major John M. Satterfield, who joined the Air Service before the war and was one of the first to go to France, and is president of the Aero Club of Buffalo, likewise assured the Commission of most hearty support and said sured the Commission of most hearty support, and said that the Aerial Derby Around the World would do more to hasten the Age of Aerial Transportation and give the human race the accompanying benefits which were its due

than anything else he knew of.

Mr. A. K. Ainlay, of the Curtiss Company, told of what

strides aeronautics was making commercially, and preadvancement within the next dicted even greater months. He thanked the Commission for having enlisted the support of the city administration in communities which, he said, he had endeavored to do for five years.

Leaving that night on its private Pullman car "Philadelphia," the Commission arrived the next morning, Oct.

11th, in Cleveland, Ohio.

Where it was met by a large Committee, comprising Where it was met by a large Committee, comprising delegations of leading citizens, not only from Cleveland, but also from Akron, Columbus and other neighboring communities. The delegation from Akron included Mr. Frank S. Lahm, veteran aeronaut; Mr. Ralph H. Upson, the aeronautic expert who finished first in the national balloon race; Mr. J. Colemon and others. Ex-Ambassador William Graves Sharp came from his home in Elyria, Ohio, to Cleveland for the purpose of extending a welcome to the Commission to the State of Ohio and to assure them of his co-operation and personal interest in the Aerial Derby.

The Commission was entertained at a luncheon at the Statler

and to assure them or his co-operation and period the Aerial Derby.

The Commission was entertained at a luncheon at the Statler Hotel, at which Major A. W. Harris, president of the Cleveland Aviation Club, presided, and were tendered expressions of welcome by Mr. Alva Bradley, chairman of the Aviation Committee of the Chamber of Commerce. After the Commission had explained the purposes of the Derby, many of the prominent Clevelanders present, as well as those from other cities, spoke and told of their great interest in the very progressive work being done by the Commission and gave assurances that Cleveland, Akron, and the other communities present would be represented in the Aerial Derby.

other communities present would be represented in the Aerial Derby.

Later a visit was paid to the Aviation Field, and the Aerial Mail Station was inspected, and the Commission was taken for a drive surrounding Cleveland.

The advent of a new kind of aircraft called the "pony airship" was announced here at the reception given to the Commission, which was attended by city officials and prominent men, including ex-Ambassador William G. Sharp, and delegations from the Chamber of Commerce of Cleveland, the Cleveland Aviation Club of Canton, and the Aero Club of Elyrai and representatives of chambers of commerce of neighboring cities and representatives of the Aerial Mail Service.

In his address Mr. Upson, the airship expert and holder of the international balloon trophy, stated that the Goodyear Company is about to put on the market a small two passenger dirigible balloon equipped with forty horse power which will attain a speed of forty miles an hour and will be so easy to pilot that any-body can do on short instruction. This airship was promptly named the "pony dirigible" and the experts consider it a valuable contribution to the development of aviation.

(To be continued)



10, No. 6.

OCTOBER 27-NOVEMBER 3, 1919

10 CENTS A COPY



A Navy seaplane in flight from San Francisco to San Diego

\$50,000,000 TO BE SPENT IN AIRCRAFT AND SUPPLIES BY COUNTRIES REPRESENTED AT CUBA AERONAUTIC CONGRESS

(This issue published November 28)

# 59 LYNITE Parts in the Postman's Plane

59 parts, 350 to 400 pounds saved to the plane-

This, in a few words, indicates how *Lynite* is helping the U. S. air mail service in establishing records for speed, fuel economy and carrying capacity.

In the pistons of postal plane engines, *Lynite* improves engine performance, reducing upkeep cost and promoting longer life.

Among the parts of mail service airplane engines made of *Lynite* are the following:

Camshaft housing
Camshaft driving shaft lower
bearing container

Camshaft housing covers

Camshaft housing cover (propeller end)

Crank case (upper)

Crank case (lower)
Crank case breather
Crank case oil filler

General driving shaft ball bearing container (upper)

Intake header

Intake header water outlet (single)

Intake header water outlet (double)

Oil pump body (upper)

Oil pump body (lower)

Oil pump body (lower half cover)

Oil pump pressure relief valve guide

Water pump bevel driver bushing housing (dist end)

Water pump bevel driver bushing housing (prop end)

Water pump body shaft bearing retainer

Water pump cover

Water pump body

Pistons

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# THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York Cit,

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1875 Copyright THE AERIAL AGE CO., October 6, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, OCTOBER 27-NOVEMBER 3, 1919

'NO. 6

# \$50,000,000 TO BE SPENT IN AIRCRAFT AND SUPPLIES BY COUNTRIES REPRESENTED AT CUBA AERONAUTIC CONGRESS.

OVER \$50,000,000 is to be spent in aircraft, motors and accessories by the countries which have accepted the invitation of General Menocal, the President of Cuba, and will send commissions to the Third Pan-American Congress which is to be held at Havana, February 31 to March 1, 1920.

The invitation of President Menocal was eagerly accepted by the different countries and special commissions

will attend the Congress at Havana.

These commissions will include the purchasing agents These commissions will include the purchasing agents of the Latin-American countries, and it is expected that orders for over fifty million dollars will be placed with the firms exhibiting at the Aeronautic Exposition which will be held during the Congress.

Prizes amounting to \$25,000 have already been offered for the contests to be held at the Havana Airport during the Congress and Exposition, and these contests will afford a conclusive test to present day aircraft.

afford a conclusive test to present day aircraft.

# American Manufacturers Invited to Participate

The Cuban authorities have requested "Aerial Age," as the national trade and technical aeronautic publication, to publish the invitation of the Cuban Government to American manufacturers of aircraft, motors, accessories, hangars and aerodrome equipment, motor trucks, trailers and motorcycles used for aeronautic purposes and on aviation fields, and motor boats and supplies such as are used at naval air stations, to send their products to Havana for the Exposition and to enter in the aircraft contests.

The Exposition will be held at the magnificent "Teatro

Nacional," where will also be held, daily, discussions on aeronautic subjects in which the world's leading authori-

ties are to part cipate.

transportation.

Full size hangars and aircraft, motors and accessories which are to be demonstrated will be exhibited at the Havana Airport, which is most ideally located.

Manufacturers desiring to arrange for exhibits and participation in the Congress, Exposition and Contests should apply to Mr. Victor Hugo Barranco, Special Agent, Cuban Government, Room 604,280 Madison Avenue, New York City.

Mr. Barranco states that American aircraft manufacturers have lost business amounting to over one million dollars from Latin-American countries during the past six months because of their inability to make deliveries. He quotes the case of Mr. Hannibal J. de Mesa, the wealthy Cuban sportsman who had to purchase six French aeroplanes for the Cuban-United States Air Line, because he could not get deliveries from United States manufacturers before the summer of 1920. So he spent \$120,000 in French planes French planes.

The representative of another Latin-American republic reported that his Government is spending close to \$500.000 in Italian planes and another government is placing large orders with British manufacturers because they found it impossible to get deliveries in the United States, where the few manufacturers who can make deliveries are swamped with orders for planes for pleasure, sport and transportation. Noted French Aviators on Their Way to Cuba

The noted French aviator Lucien Coupet, who flew from

The noted French aviator Lucien Coupet, who flew from Paris to Dakar, Africa, arrived in New York a few days ago, and has left for Cuba with the French aviator and engineer, Guy de Roig, and four French expert mechanics. The party left for Havana, Cuba, with Lieutenant Peyton Gibson, representative of the Aerial League of America, and at Havana will join the famous French Ace, Captain de Kerrilis, who has charge of the work of establishing the aerial transportation lines from Cuba to the United States, and Mr. Mark Ovenden, representative of the Aerial League of America, who went to Cuba recently in connection with the organization of the Third Pan-American Aeronautic Congress.

Mr. Coupet was in conference with Mr. Hannibal J. de

Mr. Coupet was in conference with Mr. Hannibal J. Mesa, the wealthy Cuban sportsman, who is financing the establishing of aerial transportation lines from Cuba to the United States; Mr. Victor Hugo Barranco, representa-tive of the Cuban Government in the United States; Mr. Henry Woodhouse, Vice-President of the Aerial League of America; Colonel Jefferson deMont Thompson, President of the Aero Club of America; Mr. Alan R. Hawley, Chairman of the Contest Committee of the Aero Club of America; Captain Robert A. Bartlett, Major Granville A. Pollock, Rear Admiral Bradley A. Fiske, and other aeronautic authorities, at the Aero Club of America Clubhouse, 297 Madison Avenue.

At this meeting Mr. Coupet told of his remarkable flight from Paris to Dakar, which involved flying across France, Spain, Gibraltar, Morocco, Rio De Oro, and the edge of the Great Sahara Desert to Senagal and to Oakar, a distance of 4,000 kilometers, which they covered in 34 hours and 23 minutes.

In this historic flight he used a 16-passenger Goliath Farman Biplane, which is the same type to be used in the aerial transportation line between Cuba and United States, Mr. de Mesa having bought two of these machines, as well as four smaller ones during his recent

visit to France.

At the conference was discussed the project of the Cuban Government to spend the sum of \$15,000,000 for the purchase of aeroplanes and dirigibles to establish aerial purchase of aeroplanes and dirigibles to establish aerial mail and transportation lines from Cuba to the United States and other countries and the tentative rules and regulations for the aeroplane contests to be held at Havana from February 21 to March 1, 1920, for the \$25,000 in prizes offered by the Cuban Government.

Mr. de Mesa stated that one of the Goliaths would be held that the contest of the contest

Mr. de Mesa stated that one of the Golfaths would be exhibited during the aircraft exposition which is to take place at Havana during the Third Pan-American Congress February 21 to March 1, 1920, and that another one will be flown between Havana and the United States. The four smaller planes have already arrived in Havana and are being set up. They are of the touring type and will be used for passenger carrying in Cuba beginning next month.

General Mario G. Menocal, President of Cuba, has invited the following aeronautic authorities to go to Cuba

to serve on the Board which is laying out the Havana Airto serve on the Board which is laying out the Havana Airport: Colonel Jefferson deMont Thompson, President of the Aero Club of America; Mr. Alan R. Hawley, Chairman, Contest Committee, Aero Club of America; Rear Admiral Robert E. Peary, President, Aerial League of America; Rear Admiral Bradley A. Fiske, President, Army and Navy Club and member of the Board of Governors Aero Club of America; Henry Woodhouse, Vice-President, Aerial League of America; Capt. Robert A. Bartlett, Colonel William Thaw, late of the Lafayette Escadrille, Major Charles J. Glidden, Colonel Charles Elliott Warren.

Mr. Hawley, Mr. Woodhouse and Colonel Thaw may go

to Cuba in the near future.

# COLONEL THOMPSON ELECTED PRESIDENT **AERO CLUB** OF AMERICA.

Most Successful Year in History of the Club

OLONEL Jefferson De Mont Thompson, one of the leading American sportsmen to take interest in aeronautics, having represented the Aero Club of America in international aeroplane and balloon races ten years ago, has been elected president of the Aero Club of America

Colonel Thompson was the selection of Mr. Alan R. Hawley, who has served six terms as president and declined the renomination which was unanimously tendered

A Sportsmanly Test

Desiring to select popular men as officers for the new club year, the officials of the Club, after spending months in selecting and considering candidates, decided to carry out a very sportsmanly test. The candidates were anout a very sportsmanly test. The candidates were an anounced six weeks ahead of the date of the elections, and immediately after the announcement the ten most active officials of the Club, including Mr. Hawley, Colonel Thompson, Henry Woodhouse and Augustus Post, left New York for trips which would keep them away and the colon with the official of the Club. This way and the colon with the official of the Club. New York for trips which would keep them away and out of touch with the affairs of the Club. This was done to afford an opportunity to the members of the Club to select another ticket if they desired and for any group to conduct campaigns for the election of anybody else they desired. The fact that the officials would be away until election day was published, and the press reported day by day their movements on the fourteen thousand miles aerial survey of the United States, with the commission organizing the First Aerial Derby around the world. Mr. Post went to Europe in connection with the Mr. Post went to Europe in connection with the organizing of the Derby Around the World, and the meeting of the International Aeronautic Federation.

Returning just on time for the elections, the officials found a flood of letters from members commending their selection and praising the work of the Club administration before, during and after the war.

The following gentlemen were unanimously elected:
For President: Colonel Jefferson DeMont Thompson, Chairman, New York State Aviation Board and Chief of York Aerial Police.

For First Vice-President: Chas. Jerome Edwards.

For First vice-President: Chas. Jerome Edwards.
For Second Vice-President: Lieut. Godfrey L. Cabot,
U. S. Navy, President, Aero Club of New England.
For Third Vice-President: Rear Admiral Bradley A.
Fiske, President, U. S. Naval Institute and New York
Army and Navy Club.
For Fourth Vice-President: Alberto Santos Dumont,
Honorary President, Pan-American Aeronautic Federa-

Governors, Class A, Term Expiring 1923: W. Redmond Cross, Major F. L. V. Hoppin, W. W. Miller, Colonel Jef-ferson DeMont Thompson. Term Expiring 1920: Major

Granville A. Pollock.

Granville A. Pollock.

Treasurer: Lieut.-Col. Charles Elliott Warren, U. S. A. Governors, Class B.: Louis D. Beaumont, President Commission of the Aero Club of America and Aerial League of America to organize the First Aerial Derby Around the World; Lieut. Godfrev L. Cabot, U. S. N. (Persident, Aero Club of New England); Brig. Gen. Robert K. Evans. U. S. A. (President. Aero Club of Philadelphia); Major Charles J. Glidden, President, Aerial Touring Association; John Hays Hammond, Jr., Vice-President Aerial League of America; Major Henry B. Joy. U. S. A.. Vice-President Aero Club of Michigan; Major Albert B. Lambert, U. S. A., Vice-President Missouri Aeronautic Society; George M. Myers, President Aero Club of Kansas City. Aero Club of Kansas City.

Once more the president of the Aero Club of America

is a retired successful business man, a well-known sports-man with international standing and one of the pioneer sportsmen who supported the development of the automobile in the pioneer days and contributed to the development of aeronautics since its inception—Colonel Thompson having been one of the founders of the Aero Club of

It will be recalled that Congress and government officials sought the advice and counsel of Mr. Alan R. Haw-ley in the past six years because they knew that he had no connection or financial interest in aeronautic commercial enterprises. Just as the fact that Mr. Hawley proved to be a great asset to the aeronautic movement because he was a retired business man, a sportsman and had no business or political affiliations, so Colonel Thompson will be a great asset.

It will be recalled that Colonel Thompson was one of the popular judges of the Vanderbilt automobile races, and has been prominent in different branches of sport. He is the head of the New York State Aero Commission, of which Mr. Hawley is also member, and the head of the New York Aerial Police and officer of some of the leading

clubs and associations.

Mr. Hawley Presented With Resolutions

Mr. Alan R. Hawley, the retiring president, who declined renomination for a new term, after serving six consecutive terms, and to whose administration goes the credit of having done the great things accomplished by the Club tive terms, and to whose administration goes the credit of having done the great things accomplished by the Club in the past six years, was presented with an engrossed copy of the following resolutions, adopted and presented to the Club, signed and endorsed by over one hundred leading Aces and officers of the U. S. and Allied Air Services, including the following: Lieut. Col. William Thaw, U. S. A., dean of American aviators; Lieut. George A. Vaughn, U. S. A., who has ten enemy machines to his credit; Major R. G. Landis, U. S. A., son of Judge Landis, with twelve enemy machines to his credit; Captain Edward V. Rickenbacker, American Ace of Aces; Major Melvin Hall, U. S. A.; Major Cushman Rice, U. S. A., who was in command of the first three air squadrons to go overseas with the British; Major S. Herbert Mapes, U. S. A.; Lieut. Samuel Mustain, U. S. A.; Captain Robert A. Bartlett; Captain Granville A. Pollock, U. S. A., of the Lafayette Escadrille; Captain LaHoulle, French Ace, representing the French Government; Capitaine de Femmestaime, of the French Army; Lieut. Col. Isaac Jons; Brig. Gen. T. C. Lyster, Medical Corps, Air Service; Major Louis Fisher, M. C.; Captain A. J. Boyriven. \*French Flying Corps; Ensign D. E. Huger, U. S. N., and of the Lafayette Escadrille; Wainwright Abbott, French Flying Corps; Captain M. Yorsaf of Guatemala; Ensign T. I. Turner; Ensign C. J. Coatsworth, Jr., U. S. N.; George E. Turnure, Jr., Lafayette Escadrille; Lieut. Raymond N. Estey, U. S. A., of the 99th Aero Squadron, and others.

others.

The Resolution presented to the Club by the abovementioned leading Aces and officers of the Allied Air
Forces, which are to be engrossed and presented to Mr.
Hawley on his retirement from the presidency of the Club,

"WHEREAS, The Aero Club of America has, since its foundation in 1905, been the airman's best friend and is today the mainspring of the aeronautic movement in this

"WHEREAS, Before the war American aeronautics was supported mainly by the Aero Club of America's activi-

"WHEREAS, Before America's entry in the war, when the U. S. Army and Navy had less than thirty aviators, the Club, guided by its extraordinary foresight and splen-did patriotism, undertook to train aviators and form aerial reserves, and through these efforts succeeded in training. reserves, and through these efforts succeeded in training, at private expense, over three hundred aviators, some of whom went with the Lafayette Flying Corps, and the others were commissioned in the Army and Navy Reserves, which were authorized by Congress and organized by President Wilson, upon the recommendation and urg
(Continued on page 222)



# THE NEWS OF THE WEEK



vernor of New York Appoints State

Aviation Committee.
Albany.—Governor Smith on Octor 24 announced the appointment of commission to be known as the Avia-n Commission of the State of New

The commission will make a study the subject of regulation and protion of aeronautics by the State, d will report as soon as possible to Governor suggestions for legisla-n, together with bills prepared to ry out such suggestions for introction in the Legislature during the xt session.

The committee, members of which I've committee, members of which I serve without compensation, will lude Jefferson DeMont Thompson, w York City; Robert Graves, New rk City; Colonel Archie Miller, manding Air Service activities, zelhurst Field, Long Island; Sentr Frederick M. Davenport, Cling; Assemblyman John F. Shannon, by

Colonel Thompson is chief of the Service of the police reserves, ation section, city of New York, I has taken a great interest in the ole subject of aviation.

led by Aeroplane, Securities Reach

Japan on Time.

Japan on Time.

So Angeles, Cal.—The Hellman of the Sumitomo Bank, Ltd., of aka, Japan, to deliver certain seities before November 1. In order catch a packet steamer leaving at the next day, which would make on the next day, which would make every possible on time, the Syd. aplin Aircraft Company was called on to make the delivery by air. The was made at an average speed of miles an hour, the trip north re-ring 4 hours 34 minutes and the urn 4 hours 8 minutes.

comarine Service from Key West to Cuba. Seyport, N. J.—C. J. Zimmerman, ting an Aeromarine Model 40 flyboat, left here on October 28 for a 25-mile flight to Key West, Fla., ich he expected to reach within ee days. Another Model 40 and a del 50 flying boat are being shipped rail to complete the equipment for egular service between Key West Havana.

he time between these two points steamer is from three to ten hours the average time of the flying t is expected to be less than an

r and a half.

man Goliath Planes Purchased for

Cuba-Key West Service.

ew York, N. Y.—Mr. Hannibal J.

Mesa, a wealthy Cuban sugar

tter, has purchased two Farman

passenger Goliath planes and 6 3 two-passenger Farman biplanes use as passenger carriers between a and Key West and Miami. This ance is less than 200 miles, and as Goliath planes have a range of 250 e is a very large factor of safety.

Mr. de Mesa secured the services of Captain Kerellis, business manager of the Farman Company, a noted French ace and aviation attaché of the Ministry of War, who will direct the operations of the new service, which operations of the new service, which will begin on December 1. Four well-known aviators are accompanying Captain Kerellis here, as well as a number of expert mechanics, headed by the chief mechanic of the Goliath which flew across the Sahara Desert.

In his interview Mr. De Mesa expressed appreciation of the encouragement extended to him by officials of the Aero Club of America in the furtherance of his project and of their proffer of any assistance which it can

Seaplane Makes Quick Flight to Aid

Wreck.
Atlantic City, N. J.—Proving the possibilities of seaplanes as an aid to navigation, Earle Ovington, manager of the local flying station, made a rapid flight to the scene of the wreck of the Frawley on Brigantine Shoals, four miles from here. The time of the flight was three minutes. William V. Dee, of the American Electric Railway Association, was carried as pas-

Washington University Students Organize Aero Club.

Spokane, Wash.—Returned aviators and air service men have organized an aero club at the University of Washington, the membership of which already exceeds fifty and includes a dozen or more qualified aviators. The purpose of the club is to promote interest in aviation and to secure the addition of a course in aeronautical engineering to the curriculum. A sea-plane and a balloon have been placed at the disposal of the club and a landing field selected. Exhibitions will be conducted on college gala days, and

it is hoped to enter an aeroplane in next year's intercollegiate races at Atlantic City.

Rodman Law Deceased. Greenville, S. C.—Rodman Law, brother of Ruth Law, the famous aviatrix, died of tuberculosis at the United States Public Service Hospital here on October 14. Rodman Law attained world-wide fame for his daring stunts, but he lived up to his prediction that his death was not accidental. He has made thousands of parachute jumps from bridges, buildings, aeroplanes and balloons.

Women for New York Aerial Police

New York Aerial Police Reserves.

New York, N. Y.—The New York Aerial Police Reserves are seeking thirty young women recruits between the ages of 18 and 25. About 100 men are attending night sessions at the school and instruction will be extended to women as soon as twenty are en-

Candidates for instruction at the school must pass physical and mental examinations. They will be required to purchase their own uniforms and books required during the course of their study.

It is planned to train the women to form a women's aviation corps to be attached to the Women Police Reserves. At present there are 134 professional aviators, ex-army and ex-navy men, connected with the Police Department.

Fountain Pens from New York to

Cuba by Air

New York, N. Y.—It is announced by Charles Pearson, traffic manager for the L. E. Waterman Company, the fountain pen manufacturers, that three flying boats have been chartered by the company to deliver for the company to the company by the company to deliver fountain pens along the coast from New York



The aviator's view of the Ceromarine factory at Keyport, N. J.



One of the BAT planes, known as the "Basilik," Type FK-25.

Stops are to be made at Atlantic City, Norfolk, Wilmington, Charleston, Savannah, Jacksonville, Daytona, Palm Beach, Miami and Key West. The railway express and steamship strikes have made prompt deliveries impossible and aerial delivery was found to be the most efficient and rapid means of transportation.

Mr. Pearson, W. C. Hambler, a Waterman sales manager, and C. Nicholas Reinhardt, passenger agent of Aero, Ltd., will make a trip. The chief pilot will be Robert Hewitt.

# Freight Shipped by Air Between Buffalo and New York.

Hempstead, N. Y .- The first shipment of freight by aeroplane between Buffalo and New York arrived at Roosevelt Field on October 22. The shipment was made because of the freight embargo and the longshoremen's strike here. It was a consignment of three dozen packages of hair tonic, weighing 360 pounds, shipped by a Buffalo firm.

The freight came by a Curtiss aero-plane piloted by Leo Chase. He left Buffalo October 21 and made the trip in easy stages, taking eight hours of actual flying time.

The freight was brought by motor truck to the New York office of the

concern, and it was announced that the company would continue to use the aeroplane for shipments until the strike was declared off.

# Lawson Air Liner Reaches' Indianapolis.

Indianapolis, Ind.—The Lawson Air Liner has reached Indianapolis after a 75-minute flight from Dayton, Ohio. One passenger, a newspaper man, shaved while passing over Richmond, according to press dispatches.

# Upson Wins Missouri Balloon Race.

St. Louis, Mo.—It was officially announced on October 11 that Ralph H. Upson is the winner of the balloon race which started here on October 1 under the auspices of the Missouri Aeronautical Reserve Corps. Upson flew a distance of 1,050 miles. E. H. Honeywell, who finished second, covered 920 miles, and E. S. Cole was third, having flown 860 miles.

The entries started in the following

order:

No. 1—Capt. Elmer G. Marschuetz, pilot; Lieut. Charles S. Powell, aid, St. Louis.

No. 2-Capt. Paul J. McCullough, pilot; Bernard von Hoffman, aid, St.

-William F. Assman, pilot; Joseph M. O'Reilly, aid, St. Louis.

No. 4—Ralph Upson, pilot; W. 'Van Orman, aid, Akron, Ohio.
No. 5—Capt. Carl W. Damman pilot; Lieut. Edward J. Verheyden, ai Wichita, Kan.

No. 6—Capt. John S. McKibbe pilot; Ensign Joseph F. McGuire, ai Murphysboro, Ill.

No. 7-Capt. Warren Rasor, pilo Herbert H. Rasor, aid, Brookvill Ohio.

No. 8—Capt. Ernest S. Cole, pilc Lieut. Leo C. Ferrenbach, aid, §

No. 9-Capt. H. E. Honeywell, pilo Harry Worthington, aid, Kansas Cit

No. 10-Lieut. Joseph S. Batt, pilo Jo Torrey II, aid, Aero Club America.

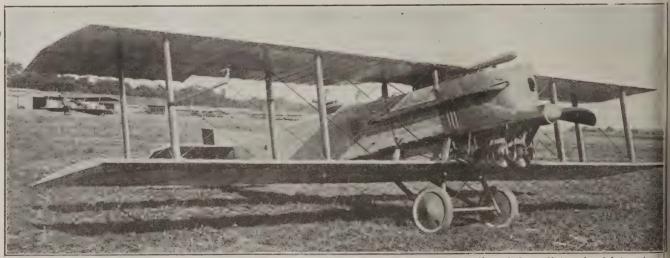
Lieutenant Batt used the same ba loon which was used by Alan R. Havley, president of the Aero Club America, and Augustus Post, the se retary, used in establishing the Amer can balloon record some years ago.

Captain McCullough, reported lo for five days after the start, w found in an isolated section of Canac 850 miles northeast of St. Louis. Ca tain Carl W. Dammann and Lieutena Edward J. Verheyden, Jr., were lo in Lake Huron.

# Seaplanes Start on Coastal Recruiti; Flight

Rockaway Point, L. I .- Five nad flying boats carrying nineteen men li gan a recruiting trip for the naval; service. Three of the craft are of t HS2 type and two of the F-5-L ty which were manufactured at the Ph adelphia Naval Aircraft Factory. In HS-2 plans are bound for Alban, where they will wait for the F-E boats, which are making a flight Burlington, Vt., before leaving for bany.

Lieutenant A. F. Dietrich is in comand of the trip. Lieutenant Dietri mand of the trip. Lieutenant Dietri, assisted by Lieutenant A. D. Mu, will pilot one of the F-5-L boats, of Ensign F. Lamb and Ensign H. Stevens, the other. The pilots a: Boatswain H. F. Davis and Mechachian R. N. Nelson; Ensign J. I. Hulse and Ensign L. A. Kloor; Liet W. L. Peterson and Ensign T. W. Peterson Ensign T. W. ers.



The 400 H.P. Liberty Farman has an excellent performance below 10,000 feet. The location of the radiators is of interest.



# small Two-Passenger Dirigible to Be Marketed.

Cleveland, Ohio.—At a reception for the special commission of the Aero lub of America and the Aerial League f America, now organizing the first erial derby around the world, it was nnounced that an Akron company is orking on a new dirigible of very mall proportnons, to be known as the ony dirigible.

The airship is to be powered by a )-horsepower engine and will attain a peed of 40 miles an hour. It will be easy to pilot that anyone can do so fter very short instruction.

The commission arrived on October and was received by city officials nd prominent men, including ex-Am-assador William G. Sharp.

Addresses were delivered by Mr. narp, Major R. U. Harris, president the Cleveland Aviation Club; Comodore Louis D. Beaumont, and Major harles J. Glidden, president and ex-partive secretary of the commission; rank S. Lahm, pioneer balloonist, and older of the International Balloon ophy.

# os Angeles Company to Establish Chain of Landing Fields.

Los Angeles, Cal.—The California, reat Western and Interstate Air oute has been organized here, after extensive study of the possibilities commercial aviation, for the purse of constructing, operating and aintaining aircraft stations at Los ngeles, San Francisco, Bay District, Paso, Texas; Portland and Seattle, ter to be extended to Alaska, Hawaii d the Philippines, as well as in sur-unding cities of California, Arizona, w Mexico, Nevada, Idaho, Montana, ashington and Oregon. The centraled control of the chain of stations

will permit of the establishment of regular schedules and the accumulation of valuable information and experience. Mr. R. J. and Mr. W. H. Daum and W. L. Shaw are promoting the plans of the organization.

# Sale of Unserviceable Planes to Educational Institutions Approved

Washington, D. C .- The War Department authorizes publication of the

following information from the Office of the Chief of Staff:

The Director of Air Service has been informed that his request for authority to dispose, by sale, of un-serviceable aeroplanes and engines to educational institutions is approved,

provided:

The unserviceable material will be sold for not less than salvage value; an aeroplane or engine to be classed as unserviceable must be fit for only salvage purposes; due precaution must be taken by the Director of Air Service to insure that the unserviceable property will be sold under conditions prohibiting its use for flying purposes and its resale, in whole or in part, during the year following the Government's sale thereof, and Clearances covering such sales must be secured from the Office of the Director of Sales.

# Chicago Company Has Sold 150 Aeroplanes.

Chicago, Ill.—The James Levy Aircraft Company, for several months sales agents for Canadian Curtiss planes, have sold 150 Curtiss planes to date, which are being flown all over the country.

Mr. Levy, accompanied by "Steve" Goodrich, chief test pilot of the company, will take a flying boat trip

through Florida this winter with hunting and fishing as its chief object.

# Citrus Growers Use Captive Balloons in Fighting Insects

Los Angeles.-Mr. Mack Swain recently demonstrated to the California Citrus Growers' Association the application of captive balloons in the fight on destructive insects. Before fumigating a tree, a large canvas cover or "fumigating tent," is placed over the tree. The derrick method of accomplishing this requires a crew of seven men and usually results in considerable damage to the tree. The capacity of a derrick is limited to fourteen or fifteen

trees an hour.
Mr. Swain's device permits of the covering of 25 trees an hour without damage to the tree, employing a crew of only four men. The tent is at-tached to the base of the balloon, the hoop encircling its base keeping it spread like a hoop skirt. The balloon is paid out by two men until high enough to clear the top of the tree, when it is hauled down by means of a small winch, the tent remaining over

the tree.

After the fumigating operation has been completed the tent is recoupled to the balloon by means of a guy hope leading from a trip hook to the top of the tent and which is slipped through a ten-inch ring at the lower end of the bag. To raise the tent the balloon is raid out until the trip hook snaps on the ring and thereby lifts the tent up, ready for the next tree.

# Personal Paragraphs.

J. L. ("Steve") Goodrich, formerly of the American Transoceanic Company of New York, is now acting as chief test pilot for the James Levy Aircraft Company of Chicago.



interesting view of the latest 300 H.P. Hispano Suiza Nicuport, which has a speed of 228 kilometers an hour and can climb 6,000 meters in 19 minutes.

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
gene Sibley, Operator in Charge Radio Maintenance of Operation



PILOTS

John M. Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T ,Lewis Walter H. Stevens Herbert M. Crader Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bestleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton Robert H. Ellis James H. Knight Elmer G. Leonhardt Paul S. Oakes Paul W. Smith Frederick A. Robins Max Miller F. A. Nutter Robinson

# Mail Plane Using Alcohol Fuel Makes 415-Mile Non-Stop Flight

Washington, D. C .- One of the aerial mail planes made a non-stop flight on October 17 with the mail from Cleveland to Jersey City, a distance of 415 miles, with an alcohol fuel. The distance was covered in 3 hours and 26 minutes, the rate of speed being 120.6 miles per hour. The first 215 miles from Cleveland to Bellefonte was made in 1 hour and 40 minutes, or at a rate of speed of 129 miles per hour.

The purpose of the test was to determine how much more mileage it was possible to get out of alcohol as compared with high-test gasoline. The results obtained are in keeping with the two months' flying on this synthetic fuel between New York and

Washington. This was the longest non-stop flight

ever made with an aeroplane carrying mail. The longest non-stop flights in the mail service heretofore have been the daily flights between Cleveland and Chicago, a distance of 325 miles.

Paul S. Oakes, a regular air mail pilot on the Cleveland-Chicago run, was the criefty the reserved flight.

was the aviator in the record flight,

the plane being a De Haviland 4, rebuilt for the Post Office Department and powered with a Liberty 400 horsepower engine.

# Transcontinental Aerial Mail Service To Start Next Spring

New York, N. Y.—Otto Praeger, Second Assistant Postmaster General, stated in an interview that as a result of the army's transcontinental aerial race information as to landing fields and meteorological conditions has been obtained for the Post Office Department which will enable it to begin a transcontinental aerial mail service next spring.

Stops are to be made at Cleveland, Stops are to be made at Cleveland, Chicago, Omaha, Salt Lake City, Carson City, Nev., and San Francisco. Emergency landing fields will be established at Bellefonte, Pa.; Bryan, Ohio; Des Moines, Cheyenne and Battle Mountain, Nev.

Although the army placed its controls 200 miles apart or even still closer, the Post Office Department will call for flights of 450 miles each. Even the present equipment is capable of such flights, and when types now

of such flights, and when types now

in development, are in production, nor stop flights of 700 to 800 miles wi be made.

# Handley Page Brings Mail From Nova Scotia

New York, N. Y.—Special aerimail from Halifax, Nova Scotia, wadelivered in New York, on October 1 Included in the bundle, which was Brought by the Handley Page bomb Atlantic, were a number of "Boo Nova Scotia" booklets, prepared by the publishers of "The Halifax Herald W. H. Dennis, vice-president of "W. H. Dennis, vice-president of "The Halifax Herald W. H. Dennis vice-president of "The Halifax Heral W. H. Dennis, vice-president of Therald Company, was a passenger the 'plane.

# A Correction

The modified De Haviland Ma The modified De Haviland Miplane, photographed of which appea below, appeared in the October 13-issue with the erroneous capti "Twin-motored French Bombing a Photography Biplane." Success: tests of this plane have been ma some time ago and reports of p formance will soon be available in publication.



The modified DeHaviland mail carrying biplane equipped with two 150 horsepower Hispano-Suiza engines.

### THE ARMSTRONG-WHITWORTH AEROPLANES

EROPLANES were built by Sir W. G. Armstrong, Whitworth & Co., Ltd., of Newcastle, as early as 1912, in which year the first aeroplane, a Farntype biplane with 50 h.p. Gnome enge, was constructed, and was afterwards of to A. V. Roè & Co., of Brooklands, wo used it for school work. This macene was built at the Elswick works, and itwas not until August the following A.r., 1913, that the Armstrong-Whitworth acraft department was formed, with wrks in the sawmills at Scotswood, near weastle. The War Office placed orders where the firm for a small number of B.E. 2 biplanes, the first of which was completed in April, 1914. Further small orders were subsequently received for the invoved type of machine known as the E. 2B, and these were completed in Agust, 1914. The aeroplane works were the transferred to new premises, and on the outbreak of war, the War Office issued intructions to extend the works, placing also same time large orders for B.E. 2C blanes.

### The 90 h.p. Biplane, Type F.K. 3

n August, 1915, a biplane having a 90 at R.A.F. engine was put in hand, incled to compete with the B.E. 2C. This mine, the F.K. 3, was successful in its r'l flights, and a large order for these mines was placed with the firm during 45. The output of F.K. 3's, which were extructed alongside the B.E. 2C's, had at reached from 20 to 25 per month, and explete squadrons were equipped for service on the various fronts. In addition a laye number were employed for training its at home. The F.K. 3 is not unlike, may general way, the B.E. 2C, which it with intended to supplant. There is the large gap and shallow, narrow fusely. The undercarriage is, however, different from that of the B.E. 2C, and consist of a central skid mounted on two large the state of the body, somewat after the fashion of the old R.E.P. moplanes in France.

### The 160 h.p. Biplane, Type F.K. 8

fowards the end of 1916 a larger and broved type of two-seater tractor billing was designed. This machine, the E. 8, was fitted with a 160 h.p. Beardine engine, and had two machine guns a wireless installation. It proved a mat success, and was built in great quantities, both by the original designers and wother firms. Squadrons of the Royal ing Corps were equipped with it and ted it on all fighting fronts, its duties incling night and day bombing, artillery fitting and reconnaissance, trench fighting dropping of food to advanced troops, at Towards the end of 1917 the output decomplete machines of this type in the AV. works had reached between 80 and a machines per month. Construction we continued until July, 1918, when the mechine was superseded by the Bristol Filter. Owing to being fitted with a vitical engine, this machine has a certain siliarity to German aeroplanes, an impossion that is furthered by the fact that the is no centre section, the two halves the top plane meeting at and being attend to the top of a cabane of steel thes. The earlier machines were fitted whan oleo type of undercarriage, somewat similar to that of the F.K. 3, but we the central skid cut short in front of

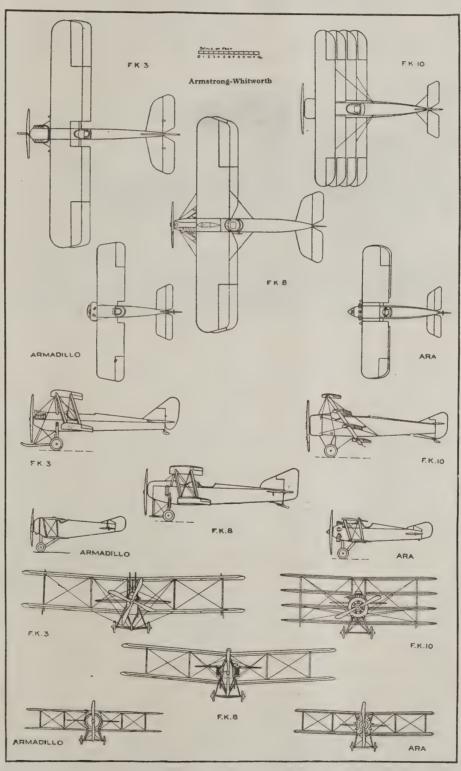
the front undercarriage struts. This is the machine shown in the accompanying scale diagrams.

There is so little difference between the two types that scale diagrams are not given of the second type. The outward appearance is the same in both cases, with the exception of the undercarriage. The F.K. 8 is greatly liked by pilots, and is generally considered safe and strong, while being easy to fly. If desired for peace purposes, the machine can be adapted to take 120 h.p. Beardmore, 200 His-

pano-Suiza, or 250 h.p. Siddeley Puma engines.

### The A.W. Quadruplane, Type F. K. 10

Next in the series comes the A.W. "Quad.," which was first tested some time in 1917. By that time the single-seater fighting scouts were being employed in great quantities, and the question of good visibility was one of paramount importance, a pilot whose machine obscured the view to a great extent in any direction being at a considerable disadvantage. This



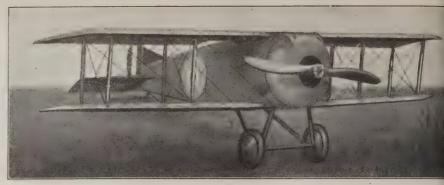
Plans, side and front views of the Armstrong-Whitworth aeroplanes

question of visibility was attempted to be solved in the A.W. "Quad.," in which, as will be seen from the accompanying illustrations, the stagger was very pronounced, while the second plane passed across some little distance above the top of the fuse-lage, the third and fourth planes passing through and under the body respectively and obstructing, owing to their narrow chord, the view to a small extent only. When this machine first appeared the triplane had been tried with fair success, but the multiplane was somewhat of a dark the multiplane was somewhat of a dark horse, as regards its aerodynamic properties.

It will be noticed that on the A.W. Quad. there is no fixed tail plane. This is probably in order to render the elevators as effective as possible, a necessary precaution on a quadruplane with its comparatively great height over the aerofoils.

### The A.W. "Armadillo"

As more powerful engines became available, the designs for a number of experi-



The A W "Armadillo" single seater fitted with a B R 2 engine

The results were so promising that it is fairly safe to say that the machine would have been put into production in time for the 1919 spring offensive. From the illustrations it will be seen that the chief characteristic of the Armadillo is that the top

for the lift wires. The rotary engine i enclosed in a circular cowl, which is sur mounted by a square, box-like excrescence, inside which the two machine gun are mounted, synchronized, of course, to fire through the propeller.

### The A.W. "Ara" Single-seater

An improved type of single-seater was contemplated at the time of testing the Armadillo. This was to be fitted with a 320 h.p. Dragonfly engine, but as considerable delay was experienced in the production of this engine, it was not until the last week in December that an engine could be obtained. In the meantime, in the hope of getting this engine, a machine had been built for it. This was the one now known as the "Ara" type. Owing to the delay in obtaining the engine it was not until January, 1919, that the machine was ready for its tests. As will be seen from the table, the performance is very good, indeed, both as regards speed and climb. In appearance the "Ara" is some what different from the "Armadillo," the top plane being placed some little distance above the fuselage, while the fact that the engine fitted is a radial instead of a rotary



The A W "Ara" single seater with a 320 h.p. A. S. C. Dragonfly

mental machines were brought out, among plane is mounted on the top of the fusethem being the 220 h.p. "Armadillo" and lage on a level with the eyes of the pilot.
the 320 h. p. "Ara." The former was Owing to the small gap between the planes
fitted with a B.R. 2 rotary engine, and the there are two pairs of inter-plane struts beyond the cowl. The undercarriage is
trial flights took place in September, 1918. on each side, thus ensuing a better angle of the usual simple Vee type.

### Specifications of the Armstrong-Whitworth Aeroplane

	0.8,	ó	o.		ing an.	Wi cho		Wi	ng area	a.*	In der	ci <del>-</del> ice.		er.	раск,	Dibe	dral.	area,		Arca.			Area.	
Type of machine.	Length	Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top.	Bot.	Gap	Stagger.	Sweepback	Top.	Bot.	Aileron	Tail- plane.	Ele- vators.	Total.	Fin.	Rudder.	Total.		
	tt.in, ft.in. ft.in. ft.in. ft.in. square feet.		et.	- 0	0	tt. in.	ft. in.	0	0	0	sa. ft.	Sq	uare fe	eet.		uare 16	et.							
F.K. 8 F.K. 10† Armadillo	28 6 30 8 22 3	40 0 43 0	40 0 43 0 27 10 27 9 27 5	5 8 6 6 3 7 5 3 5 3	5 8 6 6 3 7 4 6	229 270 102·6 125	213	442 524 398 · 4 250	2 t 2 t 3 2 t 3 2 2 3 5	12 2 3 1	5 11 5 9 2 8 3 11 3 10½	1 11 1 7½ 1 5 0 8½ 0 11½	0 0 0 0	4 5 1½ 0 1½	5 12 2 11	72 67·2 36 20·4	28·0 17·0 25·0	16. 14.0 24.0	49.0 41.0 16 31.0 49.0	5·8 7·5 1·9 1·6 2·5	0.0 8.0 8.0 9.5	15.3 22.5 9.9 7.6 13.5		
			• Including ailerons. † Area of second and third planes, each, 92.6 sq. ft.																					

### Table of weights, etc., and performance of A.W. machines.

Type of machine.			Weig macl			Range n miles).	Speed (m.p.h.).			Climb (in mins.) to			Ceiling. Landing speed.		oad/sq. ft.	oad/h.p.	ary load.
	Type.	н.р.	Empty (lbs.).	Loaded (lbs.)	- (Q P	Raj (in n	Ground level.	10,000.	15,000.	5,000.	10,000.	20,000.	ft.	m.p.h.	lbs.	lbs.	ed Military
F.K. 3 F.K. 8 F.K. 10 Armadillo ARA.	R.A.F. B: C. B.R. 2 D.	90 160 130 230 320 3 = Be	1,700 1,720 1,143 1,250 1,320 eardmon	2,300 3,000 1,804 1,860 1,925	3·5 3·75 2·75 3·25	C. =	87 102 105 125 150	65 98 99 113 144 get.			25 20 17 6.5 4.5 D. = 1		16,000 20,000 25,000 24,000 28,000 " Drag	45 . •• 55 55	5.2 5.7 4.5 7.4 7.5	25.5 18.8 13.9 8.0 6.0	

### RADIO EQUIPMENT FOR COMMERCIAL AIRCRAFT

By EDGAR H. FELIX, A. I. R. E.

Military necessity required radio equipent for aircraft; commercial air traffic ill benefit from the intensive and exnsive development which took place tring the war.

Aeronautic experts at the International onvention for Air Navigation, which rimulated air regulations during the eace Conference, recognized the important functions which radio communition on aircraft will assume. Considerions of safety demanded that all large reraft carry radio apparatus. Hence he of the regulations in the International Convention which the conference lopted requires that all aircraft capable carrying more than ten persons shall rry radio receiving and transmitting paratus. Already many applications of dio in commercial air travel have been ade.

When the R-34 arrived at Roosevelt ield, every preparation to facilitate a fe landing had been made. An important phase of these preparations was e installation of a high-power radio lephone station so that officers on the round could give directions to the naviting officers on the great airship. When the arrived over Roosevelt Field Major of hm E. M. Pritchard took a 2,000-foot trachute drop to earth. He then directed a landing by radio telephone, with the sult that the R-34 swung into her temporary berth without a hitch.

This is but one of the important uses which radio communication will be put the era of commercial air travel. The ontrol of traffic at congested aerodromes or the safety of all concerned will retire instant communication with all craft a limited area so that aerial traffic may safely handled.

The dissemination of weather informa-

tion at sea is a service in which radio communication has proved invaluable. But aircraft are much more sensitive to weather conditions and much less able to make satisfactory observations and forecasts than seacraft. The broadcasting of weather information and storm warnings for the information of aerial mariners will prove of great value în reducing the hazards of flight incident to unstable and suddenly changing weather conditions.

A system of radio beacons for night flying will serve the same purpose to the navigator of the air as the system of lighthouses serves the navigator of the sea. The speed and height at which aircraft fly will make direct observation along air lines uncertain, especially at night, for landmarks are not always recognizable.

The motorist could certainly follow a predetermined route if he knew all the landmarks along the way, the contour of the country, the rivers, bridges and forests, the church spires, hills and valleys—but how insignificant do all these guides become when compared with a reassuring sign-post, giving direction and distance.

sign-post, giving direction and distance.

In aerial navigation sign-posts are obviously impractical. The high altitudes and tremendous speeds of commercial aircraft will require more than signs painted on the ground. The huge size, high upkeep and difficulty of lighting them at night will make signs prohibitively expensive. The high altitudes at which planes will fly will cause a fog or haze to render them invisible. But a radio lighthouse, with a limited range, will make it possible to keep aviators informed of the locality in which they are flying. Automatic radio beacons of still lower power will indicate in the telephone receivers when within a thousand feet of his aero-

drome, and another signal when he approaches within five hundred feet of the landing field's center.

The type of passenger who will first use aerial transport is the man whose time is of tremendous value. He will find the radio telephone useful, even in a flight of a few hours. The expense of air transport will make it probable that flights will be undertaken only when the matter at the journey's destination is of the utmost importance. Therefore means of communicating while the plane is en route will be of great importance.

The De Haviland cross-channel ferry, which Lloyd George employed between London and Paris, was equipped with wireless telephone apparatus, by means of which the Premier kept in touch with his mission in Paris and the Government at home during his cross-channel trips.

The element of expense in the equipment of commercial aircraft will determine the type of equipment which will be used. The advantage of using radio telephone equipment, which does not require the use of the Morse code, will be offset by its cost and shorter range. Radio telegraph sets give long range for light weight and are cheap to install and maintain. But they, on the other hand, require specially trained operators familiar with the Morse code.

On the trans-Atlantic flights, the NC-4 and the R-34 were equipped with highpower radio telegraph transmitters whose signals were heard for over a thousand miles, thus making communication during the flights continuous. The radio telegraph transmitting set used on the NC-4 was designed and built by the International Radio Telegraph Company of New York to meet the need of an aeroplane transmitter to cover greater ranges than those in use for fire control. This transmitter is well adapted to use on commercial aircraft, it being low in cost and light in weight. It is designed to give a normal operating range of 350 to 400 miles under ordinary conditions, or about 250 miles under adverse conditions, although under more favorable conditions they have a range of considerable distance. For instance, on the trans-Atlantic flight, the Navy Department states that these transmitting sets were heard and copied over a filter of the property of the property

For instance, on the trans-Atlantic flight, the Navy Department states that these transmitting sets were heard and copied over a distance of 1,200 miles.

The transmitter itself consists of a 590 watt, self-excited inductor type alternator, an aluminum shell or casing, of the same diameter as the generator and attached to the rear thereof, and in which are contained the power transformer and the rotary spark gap. The transmitter complete including reel, antenna, keys and variometer, weighs but 77 pounds. To the end of this aluminum shell of the transmitter unit is attached a streamline hood, composed of fabric impregnated with bakelite. This serves as an enclosure for the condenser and the oscillation transformer which are, however, bolted to the aluminum shell, extend back from the generator rather than receiving any support from the hood. The hood is also attached to the aluminum shell, by means of slotted channels and spring dowels, which make it readily removable for inspection and adjustment. The aluminum casting is also provided with a water-tight hand hole, by which

access way be had to the rotary gap.

The generator itself is a special inductor



International Wireless Telegraph Transmitter unit, which encloses all the elements of the equipment except the controlling switches and variometer

type alternator, designed for a speed of 5,000 r.p.m., and develops form 135 to 150 volts on open circuit at 1,000 cycles. The full-load voltage is approximately 100 volts. The stator consists of four direct-current poles, into each of which are cut four slots for the alternating-current winding. The rotor is made with twelve teeth and sets as the inductor. The direct-current winding for exciting the field is wound in the slots between the teeth and delivers current to the field through an externally mounted field switch. The switch is arranged so that the alternator field circuit is closed only when transmitting and in closing the circuit a battery is momentarily in to insure it building up.

The gap equipment comprises two rotors, one having twelve teeth and the other eight teeth, mounted directly on the generator shaft by an insulating moulded hub. This gives the act two different sparktones, 1,000 and 666 sparks per second, which greatly increases the selectivity of the transmitter. The fixed element consists of two tungsten electrodes mounted on a holder which can be rotated through 180 degrees, the other electrode is brought into use with the twelve-tooth rotor, while the one located opposite the eight-tooth rotor is inoperative. By means of an eccentric bushing in the bracket by which the electrode holder is mounted on the generator rear bearing housing, the distance between the tips of the rotor teeth, and the fixed electrode can be adjusted. The angular adjustment is obtained by the loosening of the clamp that holds the electrode bracket.

The power transformer is of the closed-core type, the ratio of transformation being approximately 1 to 34.

The condenser is of the mica dielectric type, having a capacity of 0.010 mf., and is mounted by means of an aluminum casting, which also supports the oscillation transformer.

The latter is of the conductively coupled type and consists of seven turns of heavy bare copper wire, wound in grooves in a bakelite cylinder. Three taps are brought out, with suitable terminals for the primary connection, by which the primary can be adjusted to wave-lengths of 335, 375, and 425 meters. The terminals for the primary connections are mounted on the base of the oscillation transformer. The coupling taps are brought out to a switch located on the rear end of the oscillation transformer and permit adjustment to six degrees of coupling.

The antenna used is of the trailing type, consisting of a 250-foot length of silicon bronze stranded antenna wire to the end of which is attached a streamlined lead weight. The antenna is brought into the cockpit through insulators having a metallic bushing with flared ends to a reel upon which the antenna is wound when the plane is about to descend. Connection to the antenna is made by a terminal connected to the bushing in the insulator.

The antenna is paid out to its full length and the open circuit tuned by means of a variometer, which is assembled to include a hot-wire ammeter for indicating resonance.

The variometer consists of fifty turns of No. 14 B. & S. bare solid copper wire, wound on a thin hollow cylinder of micarta. The inductance is varied by means of a trolley, hand operated through a rack and pinion, which moves parallel to the axis of the coil through a recess cut in the cylinder. The trolley can, therefore, be made to cut in, or out, one turn of wire at a time as it is moved along. The dead

end of the coil is connected to the trolley contact and is thereby short circuited. A copper ring moving with the trolley inside the coil serves to prevent sparking at the trolley contacts by shielding the magnetic lines of force from the turn short circuited by the trolley.

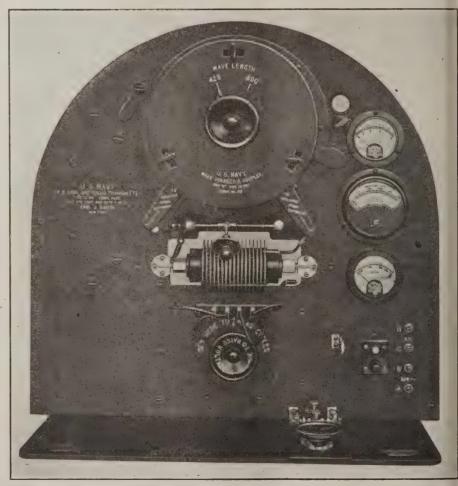
The transmitter is usually mounted on the boat by means of a special strut or wing fitting, usually on the lower side of the upper wing. On the NC type of transaction transaction is separated by the center of the boat so that when the boat was not flying the transmitter could be moved up on the strut into the wash of the propeller of the center engine. This engine could then be run at a speed not sufficient to cause the boat to move, but still sufficient to operate the radio set. A skid-fin antenna is used when operating under these conditions. This antenna amounts to nothing more than a T antenna strung across the top of the boat between the skid-fin of the plane and a lead-in dropped down from the center. The ground connection is made at the keel of the boat.

The leads from the transmitter are brought through the wall of the boat to the cockpit. In order to operate the set from various points of the boat, several keys are installed. These keys are of the flame-proof type and are equipped with winker lamps connected to a transformer across the key outsets, which serve to indicate whether or not the line is in use. When no keys are being operated the lights burn continuously until one of the operators presses his key. Then all lights go out corresponding to the operation of

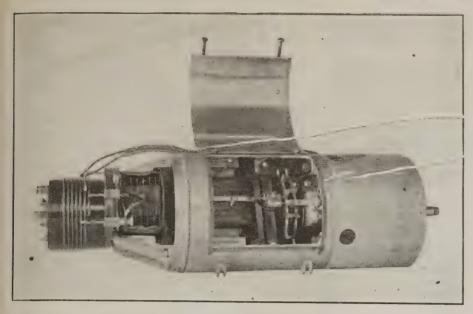
Another transmitter has been designed and produced in quantity by the Emil J. Simon Company of New York.

The generator or power source for this transmitter is a self-excited alternator of special design and light weight. It consists essentially of two generators enclosed in the same frame and with armatures on the same shaft, one a direct-current generator, which supplies excitation current, and the other an alternator which develops the primary power used in the transmitter. The shaft is mounted in ball-bearings, and the entire generator is enclosed in a suitable streamlined aluminum case to reduce its wind resistance, and to afford protection against moisture. weight of the generator complete as shown in the above plates is 28.5 pounds. The alternator is designed for 500 cycles at 5,000 r.p.m., and when driven in an airstream by means of the aerofan or propeller, may safely be operated continously at an output of 500 watts. It is of the ro-tating armature type, has 12 poles, and de-velops an open circuit voltage of 75-200 volts. Under load, this voltage drops about fifty per cent. In cases where an extra large transmitting range is desired. the generator, and in fact the entire set, may be overloaded without danger of breakdown up to 750 watts for short peri-

A manually controlled brake is supplied to stop the generator when it is not being used for transmitting purposes. This brake consists of a steel brake drum integral with the propeller hub, which is keyed to the generator shaft, and two contracting steel bands lined with a special



The control and instrument panel of the Simon aircraft transmitter on which is mounted the wave length control switch, the quenched gap, generator rheostat, generator switch, key and indicating instruments



The interior of the International radio telegraph transmitter showing the accessibility of the parts including the oscillation transformer, condenser, power transformer, rotary spark gap and generator

brake lining material. These are so arranged that a pull on a control wire, effected by a brake-control lever in the fuselage convenient to the operator, will bring the generator to a standstill. To start, it is only necessary to release the brake.

The transmitter is of the "panel" type. wherein all electrical circuits, instruments, apparatus, and controls are mounted on a panel within immediate reach and inspection of the operator. The panel is curved, as shown in the photograph, to take advantage of the curvature of the aeroplane fuselage, thus minimizing its space requirements. When mounted in the aeroplane close up under the cowl, or fuselage cover, there is still sufficient knee-room for the operator.

The weight of the panel complete is 44.5 pounds.

Mounted on the panel is the antenna ammeter reading to five amperes, the transmitting condenser having a capacity of .004 amperes, protective condensers, and the ingeniously designed coupler and wave-length changer. This consists of wave-length changer. This consists of two concentric coils, one primary and one secondary, arranged for quick demount-ing while in flight without the aid of tools. Coupling and wave-length can be changed by a simple adjustment. A wattmeter measures the primary input and a frequency indicates the cyclage the alternator is developing.

The spark-gap is of quenched type, using sixteen circular plates separated by air-tight gaskets of special material. A clip for short circuiting the gaps is provided.

A push switch is provided which opens and closes both the exciter and alternator. A safety gap protects the transformer sec ondary, the transmitting condenser and spark-gap from injury.

The two transmitters which have been described are of types which may be applied to commercial craft. They are of practical range, light in weight and simple to operate. Commercial conditions may bring about the development of radio telephone sets using vacuum-tube transmitters with sufficiently low first cost, cheap in upkeep, simple enough to operate, and long enough in range to rival the aircraft radio telegraph set. Under war conditions, where cost considerations were of minor

importance, developments did not center on apparatus especially adapted to com-mercial requirements. Further develop-ments are therefore in order which may lead to the early replacement of radio telegraph by radio telephone equipment. But at the present time the same condition which applies to seacraft is likely to obtain on aircraft. The limited range and extra expense incident to the installation of radio telephone transmitters for purely commercial purposes is such as to preclude immediate adoption of radio telephone equipment in favor of radio telegraph transmitters.

A compact and sturdy receiving equipment has been designed by the engineers of the Emil J. Simon Company for aircraft use. It is designed for reception on a wave-length scale of from 275 to 2,500 meters, with antennae of from .00029 to

.00035 mfs. capacity, which is the capacity of the average aeroplane antenna.

A single vacuum tube with a regenera-

tive circuit is employed, giving a range of approximately fifty miles. A single-tuned circuit is used but the careful design has resulted in their receiving being exceptionally selective for a conductively coupled set. Distributive capacity is practically eliminated in the inductances by the use of bank windings and short leads and low-capacity contacts contribute to the selectivity.

The weight of the receiving set, exclusive of telephone receivers and batteries,

13 x 7 x 7<sup>1</sup>/<sub>4</sub>.

The controls are exceedingly simple. The six-point switch at the top center of the cabinet provides five ranges of wavelength for an antenna with a natural period of the cabinet provides five ranges of silvers. They are a following the cabinet provides for the cabinet provides five ranges of the cabinet provides for the cabi riod of 300 meters. They are as follows:
(1) 275 to 475 meters; (2) 425 to 750 meters; (3) 725 to 1300 meters; (4) 1100 to 1970 meters; (5) 1400 to 2500 meters.

The condenser manipulated by the handle at the left is in series with the inductance in position one to three and in parallel with it on four and five. At the "off" position the "B" battery and all radio frequency circuits are opened. The low-voltage battery for lighting the vacuum-tube filament is regulated by the filament rheostat at the bottom center of the panel and can be open circuited when the ammeter at the right shows no current. The plate potential is regulated by a suitable rheo-

The tuning condenser is of balanced ype and has a capacity of from .00006 to .0010 mf. The entering edge of the movable plates is "echeloned," giving sharper tuning at the small scale readings.

The low-voltage battery, the high-volt-

age battery and the telephone receivers are attached by means of jacks and plugs at the left of the case.

The simplicity of operation, compactness and light weight of the Simon receiver makes it an excellent equipment for the commercial aeraplone, where these features, as well as low cost, are desirable



The compact Simon receiving equipment which is adapted to a long range of wave lengths

# AEROPLANE DOPES AND DOPING

By W. H. SMITH

Reprinted from Report No. 38 of the National Advisory Committee of Aeronautics.

ELLULOSE acetate and cellulose nitrate are the important constituents of aeroplane dopes in use at the present time, but planes were treated with other materials in the experimental stages of flying. The above compounds belong to the class of colloids and are of value because they produce a shrinking action on the fabric when drying out of solution, rendering it drum tight. Other colloids possessing the same property have been proposed and tried. In the first stages of the development of dope, however, shrinkage was not considered. The fabric was treated merely to render it waterproof.

The first aeroplanes constructed were covered with cotton The first aeroplanes constructed were covered with cotton fabric stretched as tightly as possible over the wings, fuselage, etc., and flying was possible only in fine weather. The necessity of an aeroplane which would fly under all weather conditions at once became apparent. Then followed experiments with rubberized fabrics, fabrics treated with glue rendered insoluble by formaldehyde or bichromate, fabrics treated with drying and nondrying oils, shellac, casein, etc. It was found that fabrics treated as above lost their tension in damp weather, and the oil from the motor penetrated the proofing material and weakened the fabric. For the most part the film of material used lacked durability.

the film of material used lacked durability.

Cellulose nitrate lacquers, however, were found to be more satisfactory under varying weather conditions, added less weight to the planes, and were easily applied. On the other hand, they were highly inflammable, and oil from the motor penetrated the film of cellulose nitrate, causing the tension of the fabric to be relaxed. The film does not possess the objectionable brittleness of glue or casein, and, in general, this type of dope had much in its favor.

About the year 1910, the Bayer Co., of Elberfeld, Germany, began to exploit a type of cellulose acetate known as Cellit for use on aeroplanes. This material had been used in the preparation of a noninflammable, celluloid called Cellon.

for use on aeroplanes. This material had been used in the preparation of a noninflammable, celluloid called Cellon. Experiments were made with thin sheets of Cellon, which experiments were made with thin sheets of Cellon, which were fastened to the fabric to protect it, and this suggested the use of cellulose acetate in solution. In 1910, acetate dopes were used and found to produce a satisfactory shrinkage, and to be proof against water, oil, and gasoline. Such dopes were more expensive than nitrate dopes, but the noninflammability of the acetate film caused a slow but general adoption of cellulose acetate solutions. At the present time such dopes are considered the best for use on aircraft.

Dopes are also used on balloon fabric to reduce the permea-Dopes are also used on balloon fabric to reduce the permeability of the fabric to gas. The English Government uses Delta dope for this purpose, a nitrate dope containing sufficient castor oil to make it nonshrinking. The Navy Department has used Delta dope on certain airships, on which the fabric had become too permeable to gas, and satisfactory results were obtained. The use of acetate dopes on balloons is

receiving consideration.

### Composition of Dopes

A dope consists of the cellulose ester dissolved in suitable solvents to which diluents are added, with the addition of plastics and a compound to neutralize the traces of acidity in the solvents, or the acidity which may develop in the film. The solvent contains a compound of high boiling point which allows the cellulose ester to emerge from the solvent mixture allows the cellulose ester to emerge from the solvent mixture in a transparent condition, free from precipitated cellulose ester which appears in the film in streaks or spots. The development of such whitened areas is known as "blushing." It results from the application of dope in a humid atmosphere, or from the rapid evaporation of low-boiling solvents and diluents, or both. In the presence of a high-boiling solvent, the moisture has a chance to evaporate before the film is dry, and the cellulose ester is not precipitated. The amount of the "bigh boiler" as it is frequently called depends upon its and the cellulose ester is not precipitated. The amount of the "high boiler," as it is frequently called, depends upon its boiling point. If the latter is high, less of the compound is needed than when it is low. Solvents with boiling points between 125° and 200 C. are generally used. A high-boiling diluert may be present in nitrate-dones to assist in the prevendiluent may be present in nitrate-dopes to assist in the prevention of blushing.

Diluents generally consist of mixtures of alcohols and hydrocarbons, and frequently denatured alcohol and benzene

are used.

Plagtic are occasionally used in nitrate dopes, but are always present in acetate dopes. The nitrate film has sufficient inherent strength and elasticity without further modification,

but a small amount of castor oil or camphor is sometimes incorporated in it. Acetyl cellulose, however, is inherently brittle and certain softening bodies or plastics must be added to it in order to impart suppleness and increase its life. A plastic is frequently a solid of low melting point, sometimes a liquid or a mixture of liquids, and generally a solvent of the cellulose ester with which it forms a solid solution. A small amount of the "high boiler" is always left in the dope film, and this also plasticizes it. A suitable base is generally present in the film to neutralize acidity. The base commonly used is urea.

### Cellulose Nitrate Dopes

Cellulose nitrate or guncotton is produced by the nitration Cellulose nitrate or guncotton is produced by the nitration of cotton or some form of cellulose approximating the degree of purity of cotton. For dopes a low nitrated cotton is desirable. It must be stable in order that no decomposition with development of acidity may occur. The high boiler in nitrate dopes is generally amyl acetate or butyl acetate. The former is a product of fusel oil and the latter is prepared from butyl alcohol, a by-product in the production of acetone by fermentation. The diluent is generally a mixture of denatured alcohol and benzene, although methyl alcohol, methyl acetone, and xylol are also employed. A low-boiling solvent. acetone, and xylol are also employed. A low-boiling solvent, such as ethyl acetate, may be also present. The solvent and diluent combination used in nitrate dopes is influenced by the degree and method of nitration, and therefore is subject to considerable variation.

### Cellulose Acetate Dopes

The manufacture of cellulose acetate is a technical art, demanding careful supervision and control. Variations of a few degrees of temperature during the process have an tew degrees of temperature during the process have an adverse effect upon the product. The correct preparation of the material is known only to a few chemists. It is quite difficult to make two batches of the ester alike, and frequently there is trouble in spite of efforts to keep the quality uniform. The material is a white solid, its appearance depending upon the method employed for its precipitation. A good cellulose acetate has an asbestos-like quality when rubbed between the fingers the fingers.

At the outbreak of hostilities in this country, dopes were prepared from scrap acetate film. These dopes did not give results in service, which should be expected of cellulose acetate. The film scrap was frequently old stock, and contained plastics. In the preparation of dope it was dissolved in suitable solvents with the addition of dope plastics. On this account the dope film was frequently overloaded with

softening agents.

The commonest "high boiler" used in this country in acetate dopes is diacetone alcohol, a product of acetone obtained by condensation in the presence of lime. In Germany, before the war, ethyl lactate was the "high boiler" in common use. This substance has a tendency to break up into ethyl alcohol and lactic acid unless certain compounds are added to it to make it stable. Methylethyl ketone in suitable amount also prevents blushing, but not as effectively as the preceding compounds, unless a considerable amount is present. In this connection it may be pointed out that a suitable proportion of alcohol and benzene, when present in the dope, removes much of the moisture present. A certain mixture of alcohol, much of the moisture present. A certain mixture of alcohol, benzene, and water has a higher vapor pressure than any of its constituents, and when this mixture results during evaporation water is readily removed. Acetone oils are also used as high boilers, but the composition of these oils varies greatly; and, because they may break up with the development of acidity unless carefully purified, they have not found as much favor as compounds of known purity.

Solvents are usually acetone, methyl acetate, methyl acetone.

Solvents are usually acetone, methyl acetate, methyl acetone, tetrachlorethane, and ethyl formate. Acetone has not been used during the period of hostilities because it has been needed in the preparation of cordite and for other purposes. The preparation of methyl acetate involves less consumption of acetate of lime than the production of acetone, and hence has been preferred because its use conserves raw material been preferred because its use conserves raw material. Methyl acetone is a product of the destructive distillation of wood. It is largely a mixture of acetone and methyl alcohol, and when the latter is acetylated, water removed, and acid present neutralized, a good solvent results. The composition of methyl acetone varies considerably, and sometimes it is

### 11D11111 11GE WEEKEL, Oct. 21-110v. 9, 1010 - 200-

# THE THIRD PAN AMERICAN AERONAUTIC CONGRESS

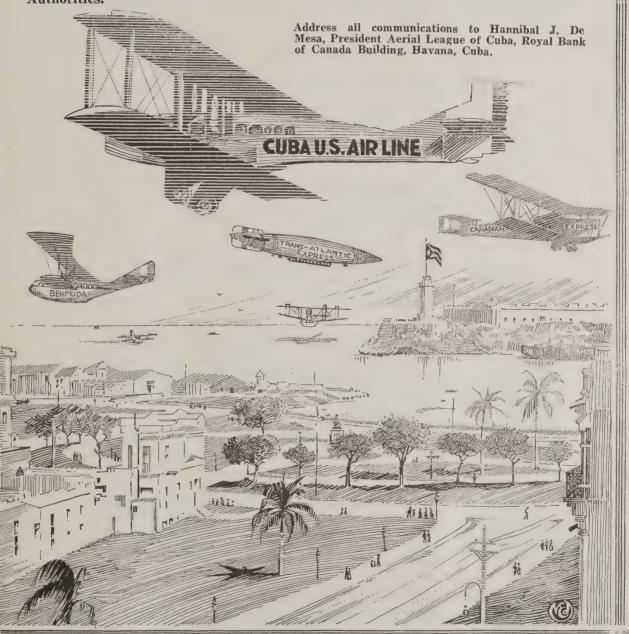
WILL BE HELD AT

### HAVANA, CUBA FEBRUARY 21st to MARCH 1st

UNDER THE AUSPICES OF

The Liga Aerea Cubana, The Aero Club of America, The Aerial League of America, La Federacion Aeronautica Pan Americana, and the Aerial Touring Association.

Exposition of World's Best Aircraft. Competitions for over \$25,000 in Prizes. Discussions of Important Phases of Aeronautic Science by World's Leading Authorities.



# El Tercer Congreso y Exposition Aeronautica Pan-Americana

Celebrada bajo los auspicios de la "Liga Aerea de Cuba," el "Aero Club de America," la "Liga Aerea de America," la "Federacion Aeronautica Pan-Americana," y "Asociacion del Turismo Aero."

Desde el Sabado, Febrero 21 hasta el primero de Marzo ambos inclusives de 1920, en la Habana, Republica de Cuba.

### PROGRAMA.

### Concursos que se verificaran todos los Dias

1. Concurso de Hidroaeroplanos (eu general).

2. Trofeo y Premios de Curtiss por aviacion maritima.

3. Concurso de Aeroplanos Terrestres.

4. Concurso de Paracaidas.

### PROGRAMA DIANO

- 1. Exhibicion de aeroplanos, motoras y sus accesorias en el Salon de Exhibiciones.
- 2. Demostracion y Ensayos de Hidroaeroplanos, Aeroplanos, Terrestes, Motoras, Globos, Dirigibles y Globos Cautinos para compradores.
- 3. Vistas Cinemalografas y Discursos sobre las fases mas importantes de lo aeronautica.

Los Gobiernos de los Estados Unios, Argentina, Brasil, Bolivia, Chile, Columbia, Costa Rica, Republica Dominicana, Ecuador, Honduras, Haiti, Panama, Guatemala, Paraguay, Peru, Portugal, El Salvador, Espana, Uruguay, Venizuela, Majico, y Nicaragua, asi como los Sociedades Aeronauticas, Deportivas, Sientificas, Industriales y Civicas, de los mismos paises, por la presents quedan invitadas para enviar representantes a asistir a este gran concurso aeronautico. Dichos representantes a sul legada a la Habana deberan presentarse a la oficina principal del Cemite encargardo de la Convencion en el Hotel Plaza, para inaribirse y al proprio tiempo recibir sus credenciales y copia del programa oficial.

El Comite de la Convencion tendra representantes en las oficinial de la Convencion Aeronautica en dicho hotel quienes expediran las credenciales e chapas oficiales de entrada al portador para el Salon Aeronautico, la Exposicion Aeronautica en el Teatra Nacional la seccion apartada para los Juecces durante el concurso, y al "Aerodromo" yestaciones para hidroaeroplanos donde habran exhibiciones de aeronaves y sus motoras.

Sirvase dirijir todas sus comunicaciones rasta el Febrero 21 proximo venidero, al Sr. Hannibal J. de Mesa, care Royal Bank of Canada, Habana, Cuba.

# Troisiene Convention et Exposition Aeronautique Pan-Americaine

Sous les auspices de la Ligue Aerienne de Cuba, l'Aero Club of America, The Aerial League of America, la Federacion Aeronautique Pan-Americaine et l'Association du Tourisme Aerien.

# Du Samedi 21 Fevrier, 1920 au Lundi l Mars, inclus. a

Concours Devant Etre Tenus Chaque Jour. \$25,000 Prix.

- 1. Councours d'hydravions.
- 3. Councours d'Avions.

- 5. Councours de Parachutes.

- 1. Exposition d'Avions, Moteurs et Accessoires.
- 2. Demonstration et assais d'hydravions et dirigeables, vallons captifs aux acheteurs eveneuels.
- 3. Transport de passagars par hydravions et dirigeables, et ascensions en ballons captifs.
- 4. Representations cinematographiques et conferences sur les phases les plus importantes de aeronautique.

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uspices de la Ligue Aerienne de Cuba, l'Aero
nerica, The Aerial League of America, la Federonautique Pan-Americaine et l'Association du
Aerien.

Li 21 Fevrier, 1920 au Lundi l Mars, inclus. a
HABANA, CUBA

rs Devant Etre Tenus Chaque Jour. \$25,000 Prix.

rs d'Aydravions.

2. Trophee et Prix Curtiss pour
Aviation Navale.

rs de Parachutes.

6. Councours de Dirigeables.

7. Councours de Dirigeables.

8. Councours de Councours de Dirigeables.

8. Councours de Dirigeables.

9. Councours de Dirigeables.

10. Councours de Dirigeables.

11. Councours de Dirigeables.

12. Trophee et Prix Curtiss pour
Aviation Navale.

13. Councours de Dirigeables.

14. Councours de Dirigeables.

15. Councours de rapidits d'ascension, de descente et de
manoeuvre pour ballons
capitis.

16. Councours de dirigeables, vallons capacheteurs eveneuels.

17. de passagars par hydravions et dirigeables, vallons capacheteurs eveneuels.

18. de passagars par hydravions et dirigeables, et ascensions

18. de passagars par hydravions et dirigeables, et ascensions

18. de passagars par hydravions et dirigeables, et ascensions

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18 Le Gouvernement Français, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants sont invites a se presenter à l'Etat Major Comite de la Convention a l'Hotel Plaza, Habana, Cuba pour se faire inscrire et recevoir leur insigne et la programme official.

Toutes comunications devront etre addressees a Monsieur Hannibal J. de Mesa, Royal Bank of Canada Bldg., Habana, Cuba.

# Terza Convenzione ed Esposizione Aereonautica Pan-Americana Sotto gli Auspici della Liga Aerea Cubana, dell'Aero Club of America, dell'Aerial League of America, La Federazione Aeronautica Pan-Americana ed the Aerial Touring Association. Dal 31 Febbraio al Primo di Marzo ad HABANA, CUBA PROGRAMMA Gare Che Avvanno Luogo Ogni Giorno 1. Gare Idroplani (generale). 2. Voli nautici apparecchio tipo Curtiss-Trofel e Premi. 3. Gare Aeroplani di terra. 4. Gare Dirigibili. 5. Gare Velocita asocsa e discesa, e manovre di Palloni frenati. 6. Gare Paracadute. AVVENIMENTI QUOTIDIANI 1. Esposizione di Aeroplani, Motori ed accessori. 2. Escrotizzioni e prove diroplani, Aeroplani di terra, motori, Dirigibili Pallanifrennati. 3. Transporto Aereo passeggeri su Idroplani, e Dirigibili Ascensioni Palloni frenati dell'Aeronautica, dell'Ordine seguente: Il Governo d'Italia e le organizzazione italiane di Aeronuatica di Sport e di Scienze d'Italia ed Italiane all estero sono invitati a mandare rappresentani ad assistere a questo grande evento aeronautico. Arrivando a Habana, Cuba, i Signori Rappresentantii dovranno presentarisi al Quartiere Generale del Comitato al Hotel Plaza, per registrasie ricevere la targhetta ufficiale, nonche il programma. Ogni comunicazione devra essere indirizzata al Signor Hannibal J. de Mesa, Royal Canadian Bank Building, Habana, Cuba.

necessary to increase its solvent power by the addition of methyl acetate or acetone. Tetrachlorethane was formerly a favorite solvent in acetate dopes. It combines the functions of a solvent and plastic and dissolves cellulose acetates of a wide degree of hydration. However, its vapor has been shown to be about four times as toxic as that of chloroform and unless pure it decomposes and causes deterioration of the fabric. The vapor of the compound causes jaundice, and in England several fatalities resulted in the application of dopes containing it. The decomposition of tetrachlorethane can be prevented by the use of suitable pigments, and the danger attending its application could be nullified if all doping rooms were provided with adequate means of ventilation. Unfortunately, ideal conditions of ventilation do not exist, and one by one, the allies have all abandoned the use of tetrachlorethane dopes. France and Italy have even ruled out dopes containing chlorine in any form.

Ethyl formate has not been used in the United States but is allowed by the British Government. It is an excellent solvent.

Diluents commonly used are denatured alcohol and benzene, sometimes methyl alcohol, either added as such or present in methyl acetone. Cellulose acetate dissolves in a mixture of alcohol and hydrocarbon when warmed and is reprecipitated in the cold, but the solubility persists in the presence of a solvent of cellulose acetate such as acetone. When the ratio of hydrocarbon to alcohol is three to one, an increased amount ot diluent may be used.

The plastics which have been proposed for use in acetate dopes include many compounds, some of which are much superior to others. Benzyl alcohol is used by the British Government. Mixtures of eugenol and triacetin have found favor in France. In this country, the commonest are phenyl salicylate, which is an excellent softener, mixtures of benzyl benzoate and benzyl acetate, benzyl acetate alone, and triacetin. Triacetin is water soluble, and may decompose with the liberation of acetic acid. Triphenylphosphate is in universal use in acetate dopes. It waterproofs and fireproofs the film, and is an excellent softener. When used in excess, however, triphenylphosphate softens in warm weather and makes the acetate film soggy. Urea is used in small amount to neutralize any free acid which may be present.

### Dope Covers

The dope, as has been previously mentioned, protects the fabric, keeping it taut, so flying is possible under all weather conditions. It is also necessary to protect the dope film by covering it with some suitable coating containing pigments to exclude light rays. Either pigmented dopes or enamels are used for this purpose. It has been conclusively proven by Dr. Ashton, attached to the Royal Aircraft Factory, that the deterioration of dopes is practically entirely caused by sunlight. His results show that the curve of the intensity of sunlight and the curve of deterioration of doped fabrics are almost identical. It is therefore more feasible to use a pigalmost identical. It is therefore more feasible to use a pigmented dope or a pigmented wood-oil varnish, rather that clear dope or varnish as a dope cover. Clear varnish has until recently been used in this country on Army planes. The Navy has used a gray, pigmented varnish enamel. Dr. Ramsbottom, also attached to the Royal Aircraft Factory, has recently demonstrated that doped fabrics covered with pigmented dope retain their toutest leaves there invited their mented dope retain their tautness longer than similar fabrics covered with an enamel. He also demonstrated that a pigmented dope retains its tautness best of all, and that such a dope effects a considerable saving of cellulose acetate. The English Government for a long time has used a type of pigmented dope, khaki colored by iron pigments and lampblack, which is called P. C. 10. It is a nitrate dope containing the pigments and sufficient castor oil to reduce to a minimum the shrinkage ordinarily effected by a dope. Reports from the front indicate that the use of such a cover has been attended by excellent retention of the tautness and durability over a long period, and Dr. Ramsbottom's suggestion regarding pigmented dopes therefore merits serious consideration.

### Application of Dopes

In the application of dopes to fabrics, it should be remembered that the fabric does not of itself shrink in the sense that mercerization causes shrinkage. In other words, there is no physical change occurring in the fabric. The dope film contracts when drying out of solution and diminishes the space between the threads, the total effect of which is slightly to reduce the original area of the fabric. The British Government at one time used a dilute solution of dope next to the fabric. This was called a scratch coat. The dope contained very little softening agent and produced maximum shrinkage. The scratch coat, however, was found to reduce the tear resistance of the fabric and was, therefore, abandoned. Such a coating penetrates the fabric evry thoroughly and locks the fibers and threads. It is apparent that the viscosity of the dope must permit of some penetration, so that the dope will not peel off, but the penetration must not be excessive. The amount of size in the fabric to some extent influences penetration. The first coat of dope is well worked into the fabric and subsequent coats are flowed over it, care being taken not to go over a given area more than once or twice, or the doping brush will drag on the dope film. Sufficient dope is applied to produce a weight increase of 2 to 2.5 ounces per square yard. The Army specifications require four coats of dope on all planes, and specify nitrate dope on training planes and acetate dope on combat planes. Two coats of clear varnish or enamel are applied over the dope.

The Navy Department specifies two coats of acetate dope over the fabric, followed by three coats of nitrate dope and two coats of navy-gray enamel. The inflammable nitrate dope is thus laminated between the relatively fire-resistant acetate dope and the enamel, the pigment in which also affords resistance to fire. It has been contended that the use of one type of dope above the other may produce two films of different physical properties, but to date no trouble has been experienced by the Navy in the durability of dopes applied as above.

### Fireproofed Dopes

Inasmuch as nitrate dope is comparatively cheap and acetate dope expensive, numerous attempts have been made to reduce the inflammability of the nitrate film. This has been attempted by fireproofing the fabric or dope or both. Fireproofing is generally effected in one of three ways-by encasing the material in a coating of inert mineral salts, by using compounds which decompose with the liberation of a gas which checks combustion, or by incorporating an organic fireproofing compound in the dope film.

Any compound used for checking the spread of combustion should not dissociate with an acid or alkaline reaction in the presence of moisture, as acids, particularly mineral acids, attack the fabric, and alkalies have a saponifying action on cellulose esters and certain plastics. A great variety of fireproofing solutions for fabrics and fire-resistant dopes have been submitted to the Bureau of Standards for examination. The best treatment for fabrics has been found to be a 10 per cent solution of ammonium phosphate neutralized with ammonia. This has been found to exert no deleterious action on fabric or dope. Soluble chlorides in general have been found to weaken the fabric.

Several pigmented fireproofed dopes have been examined. The pigments used have consisted of finely ground ammon-The pigments used have consisted of finely ground ammonium phosphate or magnesium ammonium phosphate. These are incorporated in suitable proportion in a fine state of division in a nitrate dope. The dope is applied alternately with clear dope, one coat of pigmented dope on the fabric, then clear dope, then pigmented, etc., five coats in all. A pigmented varnish is applied over the dope.

Several fireproofed dopes resembling an English product called "titanine dope" have also been submitted. These consist of nitrate dopes containing chlorides of zinc, calcium, or magnesium added in alcoholic solution. The hygroscopicity of these salts is objectionable, and such dopes tend to become

of these salts is objectionable, and such dopes tend to become slack on the fabric in humid weather. This can be overcome in part by laminating the dopes between coats of clear dope.

Nitrate dopes may also be fireproofed by incorporating tricresylphosphate or hexachlorethane in the dope film. The former compound is preferable and forms a better solid solution with cellulose nitrate than triphenylphosphate. It is necessary to fireproof the fabric when dopes of this type are applied.

### BRAZING, WELDING AND SOLDERING IN **AEROPLANE CONSTRUCTION**

By B. C. BOULTON

Aeroplane Section, McCook Field

(Continued from page ??)

In the same way that parts to be brazed or soldered should In the same way that parts to be brazed or soldered should be cleaned thoroughly, so it is necessary that surfaces, which are to be welded together, be freed from grease and scale. In welding it is essential that not only the welding wire be fused, but that both the joint surfaces be at a white heat, somewhat above 2200° F., for unless this condition is brought about no intimate alloy or union between the welding wire and the steel can take place, and the parts will be merely stuck the steel can take place, and the parts will be merely stuck together. Such a "fake" joint possesses no real strength, and because of the difficulty of detecting it in an inspection it constitutes one of the great dangers of welding.

Joining two tubes to form a T is a troublesome welding operation. Since the outside surface of the cross tube is hard, it is difficult to render it sufficiently plastic, while the thin edges of the vertical tube heat very readily. In such a case, only too often, the first tube would not be soft enough to really fuse or amalgamate with the welding wire, and the joint would be seriously defective. Joints of this character should be avoided. Welding is most effective where two edges come together. Figs. 10 and 11 illustrate some typical examples. The edges as a rule are beveled. The little fillet of steel on one or both sides of the joint is excess metal and adds to the strength of the joint. The welding of tubing, and particularly of streamline steel struts along their trailing edge, is a most important application of the process. Since with slender struts the maximum load is directly proportional to the modulus of elasticity of the material, and is practically independent of its strength, no heat-treatment is required sub-Since the outside surface of the cross tube is hard, independent of its strength, no heat-treatment is required subsequent to welding. It is not in accordance with the best practice to weld hinges, sockets, or other small parts to main members. If heat-treated, alloy steel is used in such a member, either soft soldering and pegging, or silver soldering should be employed where possible.

In ordinary oxy-acetylene welding the heat is so intense that, if the joint surfaces are properly cleaned, the use of a flux is unnecessary. However, in case the parts are rusty or improperly cleaned, a boric acid flux will give satisfactory results. Where cast iron is to be welded, a flux must always be used on account of the many impurities in the iron.

A different kind of welding wire is employed for each kind of steel. This is the source of some trouble because the operative not only has to have several grades of wire on hand, but he has to know the kind of steel to be welded before he can select the proper wire.

For aeroplane welding the oxy-acetylene torch is in most general use. In welding as in torch brazing, strains will be set up in the steel, due to sudden or unequal cooling of the set up in the steel, due to sudden or unequal cooling of the metal resulting from chilling by a cold draft of air or by rapid conduction of heat to the adjacent metal. These unequal strains are apt to cause brittleness and weakness. Therefore, a most important practice introduced during recent years both here and abroad has been the suitable annealing of welded joints. Only by such treatment can uniform strength be obtained. A joint, which before annealing or normalizing was brittle, becomes malleable. On account of withration effects it is imperative that the steel he reasonably vibration effects, it is imperative that the steel be reasonably ductile. Tests made on welded joints show that, if the work is properly done and the parts annealed, vibration does not seriously affect a weld. Frequently welded tubes have broken entirely outside the joints.

Although the chief advantage of welding over brazing and soldering is that it is possible to restore the strength of a member by adequate heat-treatment after the strength has been lowered by the heat from welding, yet high carbon steels do not give fully satisfactory results in welding. The ideas of English engineers on this point are expressed by Mr. Hackett in Aeronautics, "As regards welding of any description to be done on tubing, we do not advocate the use of tubing made from steel too high in carbon. A low carbon steel gives the better results, and it is also essential that the phosphorous content of both tube and welding wire be low." The same opinion is held by experienced welders in this country. And not until we do get into high carbon and alloy steels does the strength of the steel go above 80,000 pounds. Although the chief advantage of welding over brazing and

This is but a little over the strength that can be obtained with brazing on medium carbon steel. The universal standard for tubing, known as half hard steel, .25 to .35 per cent carbon, has as high a carbon content as is advisable. The argument just given against high, straight carbon steels does not apply with equal force to alloy steels with low carbon content.

Unless welding is done with extreme skill and care a certain amount of decarburization will occur just outside the welded area. With much welding this decarburization is nearly complete, so that a medium or high carbon steel is changed into nearly pure wrought iron with a strength of only 50,000 pounds per square inch. No amount of subse only 50,000 pounds per square inch. No amount of subsequent heat treatment can ever appreciably improve matters, and instead of perhaps 100,000 pounds per square inch material, one may have but 50,000 pounds per square inch stock, a condition that in some cases would prove disastrous. Further research work is to be done on this phase of the subject by the Metallurgical Section.

Study of a weld under a microscope reveals the fact that the welded material is not of a close, homogeneous structure but appears spongy in general texture.

Another point which deserves emphasis is that the filing of a weld is not permissible. The Navy has adopted a British specification on this subject, as follows, "On no-account should welded joints be cleaned up by filing, as such treatment may involve serious loss of the efficiency of the weld." the weld."

the weld."

Welding requires a much higher grade workman than either brazing or soldering. It is, as a rule, a long, tedious job, especially on a large fitting. Consequently, welding is an expensive operation. The general reliability of welding is less than that of brazing, because the strength of a joint is so much more dependent on the care and skill of the operative. One of the best reasons that welding does not give the same satisfaction in aeroplane work that it does in ordinary commercial work is that the material for aeroplane construction is fairly light gauge. Any burning or oxidation will therefore affect a large percentage of the metal in a section. It is for this reason that it has been impossible to use welding in the manufacture of bicycle frames which are usually .028" or .035" gauge. Metal thinner than .050" is apt to cause trouble. than .050" is apt to cause trouble.

In England, soft soldering is very popular and is used on the fittings of the Bristol, the SE-5, and the Handley Page almost exclusively. Though its use in this country is not so widespread, yet in many cases it is possibly better than either brazing or welding. As the English have had such extensive experience with this method it would be well to have their opinion, as expressed by Mr. Hackett: "Generally speaking, it may be taken for granted that with ordinary care, and with good quality of soft solder, a joint can always be made to withstand a shearing stress of 5600 pounds per square inch on the solder itself, provided (and this is the crux of the whole matter) that the articles are well tinned and cleaned prior to the operation of sweating." From the results of a number of vibration tests conducted by Mr. Hackett on soft soldered joints, he drew the conclusion that "a very satisfactory result can be obtained if the sweating is done thoroughly and well, and added strength is given if the joint be pegged." The joints tested stood up well in the vibration tests. They were not made up specially, but were selected from the current product which was soldered by girls with only a short training. dered by girls with only a short training.

The great advantage of a soft soldered joint is that by no possibility can the heat from the soldering affect the strength of previously heat treated stock. Where it would be impracticable or inconvenient to heat-treat such material after brazing or welding, soft or silver soldering must be resorted to. The melting temperatures of solders vary with the relative proportions of the constituents. With a typical soft solder, 60% tin and 40% lead, this temperature is 370° F., well below an oxidizing heat. With a typical soft, silver solder of the proportions, 56 parts silver, 28 copper, 12 zinc-

and 4 tin, the melting point is about 1000° F. Although steel will oxidize at this temperature, yet as it is below the lower critical point, there will be no change in the internal structure or composition of the steel, and hence the properties given it by previous heat-treatment will not be affected.

A large variety of different solders can be prepared to meet various conditions. They may be roughly divided into two classes: the hard solders or brasses, and the soft solders two classes: the hard solders or brasses, and the soft solders or lead-tin alloys. Alloys containing only copper and zinc have high melting points and are used for brazing. The addition of considerable amounts of silver to such a solder lowers its melting point to a very marked degree, and produces the alloy that is used in silver soldering. It is approximately 3/4 as strong as a 50-50 copper-zinc alloy and may be assumed to have a tensile strength of 20,000-25,000 pounds per square inch. The group of lead-tin solders have both low melting points, 370°-500° F., and low strengths, 6000-7000 pounds per square inch. An increase in the percentage of tin softens the solder. These three types of solders constitute those in general use for aeroplane work. tute those in general use for aeroplane work.

In soft and silver soldering operations it is perhaps even more important than in brazing to have the surfaces of a joint clean. The directions previously given under the discussion of brazing for the mechanical or chemical cleaning of steel surfaces are applicable here.

In all kinds of soldering, boric acid forms a satisfactory flux. Especially with silver soldering it is well to smear the joint surfaces of the metal with the flux in the form of a paste.

The apparatus used for melting the solder and heating the metal may be a simple soldering iron, or a blow lamp with a coal gas jet, or an oxy-hydrogen or acetylene flame. The three kinds of jets are probably equally good, and are each better than the soldering iron, except perhaps for awkward corners. When soldering operations are put on a large production basis it is likely that an electrical device will replace other types for much routine work.

Soft soldering is a process so familiar to many people that no detailed description will be given. After a careful cleaning, the next essential step is a thorough tinning of the parts by dipping into a bath of molten tin. Everything the parts by dipping into a bath of molten tin. Everything is now ready for the application of the solder itself. This is melted along the edges of the joint and drawn up into the joint by sweating it. The strength of the joint depends on the thoroughness with which this operation is carried out. The principle which determines the flow of the solder is that it follows heat, always flowing toward the hottest points. As is true with brazing, the thinner the joint, within the limits of .001 to .008 in., the stronger it will be. No difficulty is experienced in making the solder penetrate a joint with a clearance of .002 to .003 in.

The practice of pegging a joint, or inserting before the soldering, a number of small steel pins or rivets about 3/32 in. in diameter, adds much to its strength and reliability.

Soft soldering is a process requiring a greater skill and training than dip brazing, and one more dependent upon the human element. It is also considerably more expensive than the latter method because much slower. The strength of a soft soldered joint is less than a quarter of that of a brazed one and is not so uniform. Therefore, for the most part this process should be restricted to those cases in which the heat from welding or brazing would impair the strength of heat from welding or brazing would impair the strength of a heat-treated member which can not be readily heat-treated afterwards, and where the soldered area is sufficient to provide the required strength.

Silver soldering may be employed where the design of the fitting is such that with soft soldering the joint area would not be large enough to give the necessary strength.

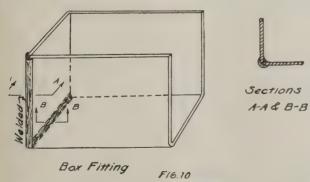


Fig. 10. Examples of Welding.

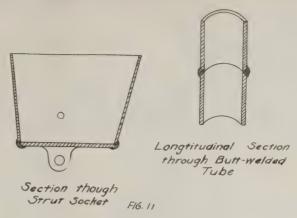


Fig. 11. Examples of Welding.

If the solder itself were not so expensive this process would

If the solder itself were not so expensive this process would be much more widely used since, while silver soldering is nearly as strong as brazing, it does not affect the strength of heat-treated members. The process itself is very similar to that of torch brazing. A good deal of care and skill is necessary to produce uniformly satisfactory joints.

However, it is rather in the soldering of copper and brass than of steel parts that silver soldering finds its most important application. The solder used for this purpose is usually not so rich in silver as the silver solder previously mentioned. A composition of 5 parts silver, 4 parts zinc, and 6 parts copper would be suitable. If the material to be joined is brass, the melting point of the solder should be about 400° F. below that of the brass, or not over 1200° F. If copper only is being soldered the fusing point of the solder may be considerably higher, or about 1500° F. To obtain a solder of the latter type the proportion of silver could be reduced to around 20 per cent. On tanks subjected to high pressures ordinary soft solders will not hold, and must be replaced by silver solder. For all parts, which in case of fire from the engine would be subjected to severe heat, silver solder should always be employed. The use in such places of soft solders, whose melting points are generally less than 400° F. is very dangerous and should be entirely prohibited. entirely prohibited.

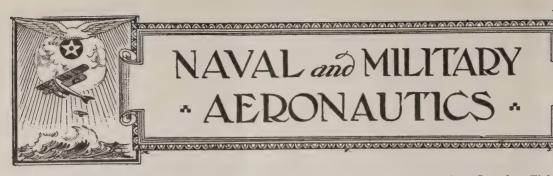
### General Conclusions

During the discussion, the principal advantages and limitations of each of the three main processes of brazing, welding, and soldering have been indicated. As has been suggested, each method has its special uses. However, for general aeroplane work dip brazing is unexcelled in cheapness eral aeroplane work dip brazing is unexcelled in cheapness and reliability. Any existing prejudice against this method, provided that reasonable care is exercised and that the simple, correct procedure is followed, is unjustified. Further development work on dip brazing within the next few months will somewhat improve current practice, and will probably make it possible to use this process where at present welding or soldering is resorted to. It seems likely that methods will be perfected for the heat-treatment of brazed parts. This would make possible the brazing of high strength steel,

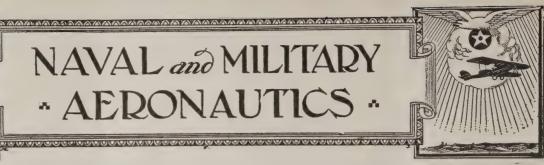
### TABLE I

TEMPERATURES AND CORRESPONDING COLORS FOR STEEL (From Bullen's "Steel and Its Heat-Treatment") tigrade. Fahrenheit

entigrade.	ramennen.	
Temper	ature.	Color.
221°	430°	Very pale yellow.
238°	460°	Straw-yellow.
249°	480°	Dark yellow.
260°	500°	Brown-yellow.
277°	530°	Light purple.
288°	550°	Dark purple.
299°	570°	. Dark blue.
400°	750°	Red, visible in the dark.
565°	1050°	Blood-red.
635°	1175° ·	Dark cherry.
675°	1250°	Medium cherry.
745°	1375°	Cherry or full red.
840°	1550°	Bright red.
900°	1650°	Salmon.
940°	1725°	Orange.
995°	1825° .	Lemon.
1080°	1975°	Light yellow.
1205°	2200°	White.



# NAVAL and MILITAR EDONAUTICS



### To Train Pilots at March and Carlstrom Fields

Washington, D. C.—According to reports from the Air Service, training of pilots will be resumed at Carlstrom Field, Arcadia, Fla., and March Field, Riverside, Cal., before November 1st. All cadets will be put through a standardized course of instruction and will include advanced military for the case of the c include advanced military flying training.

### Secretary Daniels Now Proposes Commission to Control Radio

Washington, D. C .- Having found a sentiment against permanent naval control of all radio communica-tion, Secretary of the Navy Daniels has offered a substitute scheme. A national radio commission is to control the operations of private stations at rates to be fixed by the Navy Department and Congress. All private stations would be licensed by the commission, their corporate affairs supervised, the operating staffs examined and licensed by the commission, which will consist of four members and a secretary to be appointed by the President, with representation from the Navy, War, Commerce and Post Office Departments. The Secretary would be a line officer of the Navy.

### Discharges Hereafter Only by A. G. O. Order

Washington, D. C .- Authority heretofore delegated to various commanders to discharge emergency officers is revoked effective November 1. Applications and recommendations for discharge will be forwarded to the War Department for decision in the same manner as those of officers of the permanent establishment. Orders for discharge will only be issued through the office of the Adjutant General. A list of emergency officers still on duty will be published monthly.

Emergency officers will be subject to

the same regulations as apply to permanent officers regarding the issuance of leaves, Circular 244, War Department 1919, having been revoked.

### Air Service to Economize

Washington, D. C ..- In order to keep within the limits of the Air Service appropriation for the fiscal year 1920, the Director of Air Service has decided that in the future: (a) Exhibition flights of aircraft for civilian or, semi-official purposes cannot be authorized. Flights for other than training or war purposes will be limited to those official and emergency purposes set forth in Par. 1, Section 1 of Orders No. 14, O.D.A.S., 1919. (b) Cross-country flights are prohibitive except when performed in connection with an established course of training pilots, observers, etc., or except when

in connection with a project approved by the Director of Air Service. The term "cross-country flight" as used in this paragraph will be construed as including all flights which would necessitate more than one renewal of the the gasoline supply away from the home aerodrome of the aircraft in question.

### Joint Army and Navy Board on Aero-

nautics to Study Estimates
Washington, D. C.—The Joint Army
and Navy Board on Aeronautics will
study the naval and military estimates for 1921 before they are submitted to Congress with a view to avoiding duplications and affecting economics.

### Col. Townsend F. Dodd Killed On Way To Race

Langley Field, Va.-Colonel Townsend F. Dodd, commanding officer at

Langley Field, was killed at Bustleton Field on October 5, on the way to the Army Transcontinental Air Race. Col. Dodd joined the Army in 1912. In March, 1913, he was attached to the Aviation Section of the Signal Corps and was rated a military aviator on December 30. After serving in various capacities, including that of Department Aviation officer Southern Department, he went overseas on May 28, 1917, with General Pershing as Air Service Officer. He was placed in charge of the purchase of aircraft equipment from the French Government and was a member of the Joint Army and Navy Aircraft Committee in Paris of the Aircraft Production Board. Later he was made Chief of the Air Service of the First Army. He was awarded a Distinguished Service Medal for his excellent work. The Air Service has lost a capable ond valuable officer in the death of Colonel

Total ..... 47

### TEMPORARY LOCATION OF AIR SERVICE

Washington, D. C.—Upon the recommendation of the Director of Air Service, the following assignment to stations of "Heavier-than-Air" Service Units, under the temporary allotment of 12,088 personnel, is approved. This approval does not carry any approval as to permanent location of flying or training fields. This shows the stations to which these units will be sent as occasion arises. No changes of station will be made without further order in each specific case.

AIR S	SERVICE		
	R-THAN-AIR		
MEXICAN BORDER Permanent Station	Immediate Station	Present Station Com	m. Enl.
1st Wing HdqrsKelly Field 1st Surv. Group HdqKelly Field 8th Surv. SqdnKelly Field	Kelly Field Kelly Field Flight (A-McAllen (B & C La-	to be organ'd. to be organ'd. A—McAllen B & C Laredo	6 50 8 50
90th Surv. SquadronKelly Field	( redo Flight (A—Eagle	A—Eagle Pass (same)	
	(Pass (B & C Kelly (Field		19 132
104th Serv. SqdnKelly Field 12th Obser. (Army Sdn) Rockwell Field 2d Photo SectionKelly Field 5th Air Park (Temp.). Kelly Field Mechanics SchoolKelly Field 1st Pursuit Gr. HdqSelfridge Field 27th Pursuit SqdrnSelfridge Field 94th Pursuit SqdrnSelfridge Field 95th Pursuit SqdrnSelfridge Field 147th Pursuit SqdrnSelfridge Field 147th Pursuit SqdrnSelfridge Field 1st Bombing Gr. Hdq. Ellington Field 1th Bombing SqdrnEllington Field 20th Bombing SqdrnEllington Field	Kelly Field Flight (A-Marfa (B & C El) ( Paso Kelly Field	Scott Field Langley Field Kelly Field Ellington Fid. A—Marfa B & C El Paso.  Ellington Fld. A—Douglas B & C El Paso.	19 132 19 132 1 20 8 172 11 678 8 50 24 151 24 151 24 151 24 151 24 151 3 50 31 145
166th Bombing Sqdrn. Ellington Field 1st Photo Secton Ellington Field 2nd Air Park Co Ellington Field	( Paso El Paso El Paso El Paso		31 145 1 20 8 172
1st Constr. Sqdrn. (temp.)	Kelly Field	Kelly Field	11 150
THE TOTAL TO		Total 3	66 3,124
PHILIPPINE ISLANDS			
1st Obser. Gr. HdqPhilippines 2nd Obser. SqdrnPhilippines 3rd Obser. SqdrnPhilippines 6th Photo SectionPhilippines	Philippines Rockwell Philippines to be organized	Philippines Philippines to be organ'd.	8 50 19 132 19 132 1 20

Permanent   Statoin	Immediate Station to be organized Hazelhurst Field Hawaii to be organized	Present Station Col to be organized	19 19	Enl. 50 132 132 20 *
CANAL ZONY		Total	47	334
CANAL ZONE         3rd Observ, Gr. Hdq.         Canal Zone           7th Observ, Sqdrn.         Canal Zone           12th Photo Section.         Canal Zone		to be organizedto be organized	19	50 132 20
LANGLEY FIELD		Total	28	202
1st Army Obser, Gr. Hdq	Langley Field Langley Field Langley Field Langley Field Langley Field	to be organized Langley Field Langley Field Langley Field to be organized to be organized	19 20 1	50 132 132 100 20 50
POST FIELD		Total	73	484
135th Observ. Sqd. (corps)	Post Field Post Field	Post Field		132 20
NACTIVITY PIPER		Total	20	152
ROCKWELL FIELD 9th Observ. Sqd. (corps)Rockwell Field	Rockwell Field	Rockwell Field	19	132
MATHER FIELD 94th Observ. Sqdrn. (corps)	Mather Field	Rockwell Field	19	132
CARLSTROM FIELD Pilots School	Carlstrom Field	Carlstrom Field	44	429
MARCH FIELD Pilots School	March Field	March Field	44	429
BOLLING FIELD 10th Observ. Sqdrn. corps)Bolling Field	Boling Field	Bolling Field	19	132
99th Observ. Sqdrn (corps)Bolling Field	Boling Field	Bolling Field		132
ABERDEEN		Total	38	264
258th Observ. Sqdrn. (C. D.)	Aberdeen	Aberdeen	19	<b>1</b> 32
HAZELHURST FIELD         5th Observ. Sqdrn. (C. D.)         Hazelhurst           1st Observ. Sqdrn. (army)         Hazelhurst           14th Photo Section         Hazelhurst	(C. Z.) Hazelhurst (C. Z.) Hazelhurst to be organized	Hazelhurst	19	132 132 20
**************************************		Total	39	284
BROOKS FIELD 15th Photo SectionBrooks Field		to be organized	1	20

### CURTISS PATENTS CRUISING HYDROAEROPLANE

Buffalo, N. Y.—The Curtiss Aeroplane and Motor Corporation have obtiss' cruising hydroaeroplane through Patent Specification No. 1,316,277. The invention covered by this patent consists of a means of enabling flying boats to proceed as a motor boat after being stripped of its flying equipment as covered by a previous Curtiss patent. A motor (22) is coupled within the hull (10) to a water propeller (30) projecting from the hull immediately behind the hydroplane step (12). The driving shaft (29) for the

propeller is jointed (28) and mounted so as to permit the propeller to be hidden away in a suitable recess (33) provided in the hull for its accommoperation when not in use. A controlling lever (35) locks the shaft into either position. The patent further provides for driving connections (52) between the hull motor and the engines which drive the propellers (20) by means of which the hull motor can be used to start the aerial engines. Ready means of disconnecting (51) these shafts permits the dismantling

of the craft in accordance with the patent previously mentioned. This patent covers the construction of a flying boat so designed as to permit the wings to be shed instantly at the desire of the aviator in order that the craft may be stripped to its motor boat essentials, which is a valuable feature in case of storm, in attempting to reach an anchorage having a restricted approach or for purposes of concealment. The details of construction of the device are shown in Figure 1.

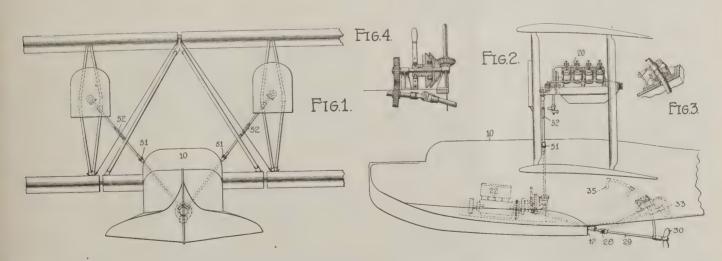


Fig. 1—Front elevation. Fig. 2—Side elevation. Fig. 3—Detail of lock for holding propeller shaft in position. Fig. 4—Longitudinal section of clutch mechanism and connections.



## FOREIGN NEWS



### French Government Aiding Commercial Aviation

Paris, France.-The general co-ordination of aeronautical effort in France under the Department of Civil Aeronautics has formulated a plan of action for the stimulation of commercial aeronautics. The Department is divided into three branches, the Service of Manufactures through which all orders must pass; the Service of Study and the Service of Aerial Navigation.

The latter department consists of civilian and military technicians who are working under the direction of Lieutenant Colonel Sacconey in mapping out air routes and

developing aerial navigation.

A network of aerial ports is being mapped out so that an aviator in cross country flight will always find himself within range of an aerodrome. A system of radio telegraphic transmission of meteorological information is being established and last but perhaps most important of all a system of financial aid to commercial aeronautics is being worked out.

This system of premiums will be paid in proportion to the following costs:

Original cost of aeroplane. a.

Duration of stages of route without landing. Motive power maintained by mechanicians. Speed of plane on regular routes. Tonnage carried.

Passengers carried. Military value.

Public interest aroused.

By means of the information thus obtained it will be possible to secure an exact estimate of the cost per kilometer. It now amounts to 5 or 6 francs for an aeroplane with a carrying capacity of 500 kilos and 10 to 12 francs in the care of a machine carrying 2 tons.

### Canadian Imports From Europe Expedited By Aeroplane

London, (via Montreal).—Paris millinery for Canadian buyers is to be carried by aeroplane to London and from there shipped across the Atlantic with all speed, in order to meet American competition.

The Canadian Express and Grand Trunk companies entered into such an arrangement with a British areoplane company, in competition, it is explained, with New York

These companies have also established an arrangement under which Canadians arriving in England can receive transportation by air to the continent or any part of England.

### \$125,000,000 Aeronautic Approporiation by Japan

Tokio.—The Japanese Government is preparing to appropriate \$125,000,000 for the development of aviation to be expended in four or five years.

### Handley Page London-Brussels Service Running

London.—The Handley Page London Brussels service was inaugurated early in October, using the same type of plane employed on the London-Paris route. Ten passengers, thirty pounds of personal luggage for each and 500 pounds of general express matter can be carried. Private laundulettes await passengers at each aerodrome to

convey them to the center of the city.

On Monday, Wednesday and Friday, the plane leaves
London, and Brussels on Tuesday, Thursday and Satur-

day.

### Swedish Aviator Flies Length of Sweden In 71/2 Hours

London.—The Handley Page London-Brussels service tire length of Sweden from Ystad to Haparanda and thence to Boden, in 7½ hours without landing, according to a British aeronautical publication. The distance is 1,420 kilometers (880 miles), and was covered at an average of 117 miles an hour. A Swedish aeroplane equipped with a 260 horsepower engine was used.

### Mexican Daily To Be Delivered By Air

Laredo, Tex.—According to information from Mexico City, Felix Palavicini, publisher of El Universal, has applied to the Secretary of Communications for permission to establish an aerial delivery service for his newspaper to Pachuca, Toluca and Puebla. Senor Palavicini was formerly a member of the Carranzaista Cabinet and was decorated by several allied governments for his services to the Allied Cause. to the Allied Cause.

### Peruvian Government To Aid Aviation

Lima.—The Government of Peru is preparing for an extensive programme of aviation under the direct supervision of a French commission of aviation experts who have arrived in this country.

### Ready To Begin London-Australia Flight

London.—Captain Matthews and Sergeant Tom Kay are about to start on a long flight to Australia for a fiftythousand-dollar prize offered by the Commonwealth Government. Their machine is a specially built Sopwith, with a 375 horse power Rolls-Royce engine, very similar in general lines and dimensions to the machine used by Harry G. Hawker and Commander McKenzie Grieve in their attempted transatlantic flight, except that the tanks are smaller and the cockpit takes the form of a comfortably inclosed limousine, with windows in the side and floor.

An ingenious feature is that sliding panels in the roof and rising seats enable the aviators to occupy the ordinary open position in which they are protected by the usual wind screens. The airplane is very fast, but immensely strong, and can land at very low speed. These qualities are called for by the fact that beyond kangoon

the landing grounds are very problematical.

The route which will be followed is over France, Italy, and Greece; across the Mediterranean (300 miles of sea passage) to Egypt; over Mesopotamia and along the Persian Gulf to Karachi and thence across India to Calcutta. then along the Dutch East Indian islands to Timor and Port Darwin. Roughly the total distance is 10,000 miles.

Captain Matthews, who is an old sailor and knows the Pacific islands intimately, is relying upon the hospitality of the various countries, but he is also taking a large supply of concentrated foods—and a repeating rifle. He is an expert navigator, and his instruments for observation and compass correction have been especially designed by himself. It is expected that the start will be made from Hounslow in the near future.

### Hotel Man Makes New York-Paris Trip Without Land **Transport**

Lucius M. Boomer, managing director of the McAlpin Hotel and president of the Waldorf-Astoria, Inc., is in Paris, having come here from New York city by way of London without having set foot aboard a railway train. After leaving the steamship aboard which he travelled from New York to England, Mr. Boomer took an aeroplane for Paris. In the same airplane with him were Commander and Mrs. Benjamin Brice, who came all the way from Louisville, Ky., to Paris without using a railway train.

### Jansen Wins Deutsch Cup

Paris.—The aviator Jansen on October 13, won the Deutsch cup, presented by Henry de La Meurthe Deutsch, president of the Aero Club of France, by covering 118 miles, 440 yards in 56m. 56s.

### Non-Stop Flight From Barcelona to Lombard

Rome.—A Nieuport machine piloted by Busio and Caratti landed on September 4 at Varese, near Como, Lombardy, after a 400 mile non-stop flight from Barcelano.



# ELEMENTARY AERONAUTICS

# MODEL NOTES By John F. McMahon



### THE LOENING MONOPLANE SCALE MODEL

Scale models are interesting and worth while because a scale model is almost a proportionate copy of the larger machine and because of the difficulties which are encountered in flying this type of model. The experienced model flyer knows how difficult it is to balance a scale model in order to make it fly, and extreme care must be exercised in order to protect the model from possible smash-ups. There is more satisfaction in flying this type than the "racing" type because it is like its prototypes, this is, like the particular machine it is modeled after. If the reader will follow this article carefully and refer to the accompanying drawing, he will have little difficulty in making this model fly.

The body or fuselage should be constructed first and to insure success, must be made as light as possible. Only too many well made models have been failures because the builder did not use enough cars in making the parts. The fuselage should be made of 1-8 of an inch square wood glued and nailed together as shown by the dotted lines. There is a tendency to split the wood when driving the nails, but if holes are drilled through the longerons with a small No. 60 drill this will not happen. Another way to construct the body is to use thin strips of bamboo about 3-32 inches thick and fastened by wrapping with thread and glue where the struts and longerons meet.

Before covering the body, the motor stick should be made and fastened into place. This part is short in order to keep weight off the tail. The stick is 3-16x5-16 inches and set on edge for strength. At one end a hook is fastened to hold the rubber, at the other a propeller bearing, preferably of the ball-bearing type, and between these two fittings (rear hook and propeller hook) 12 strands of 1-8 of an inch wide flat strip rubber are used. The motor stick is then fastened into place about 1-2 of an inch below the top longerons, and so placed to allow the propeller to be fastened to the nose.

The body is then covered with China silk or thin bamboo fibre paper and then shrung and treated with some sort of dope. (Dope is a term given to the preparations used on aeroplanes and all parts covered with fabhic.) When this is done a dummy engine should be placed in the nose to give the model a finished look. The dummy consists of only the upper parts covered with fabric.) can be carved out of wood) placed on the upper longerons as shown.

The landing chassis is next put in place. The axle is a 6 inch piece of steel rod 1-16 of an inch diameter threaded at the ends for a nut. The wheels are 2 inches in diameter and rubber tired. The "V" struts

are made of 3-16 of an inch rattan or reed and fastened to the body by the use of sockets. The stabilized and flaps are next made and are built up of 1-8 inch round reed or 3-32 inch bamboo strips as shown by the dotted lines. The rudder and fin are constructed in the same fashion. By all means be sure to keep these parts as light as possible, and when finished they should be covered and doped.

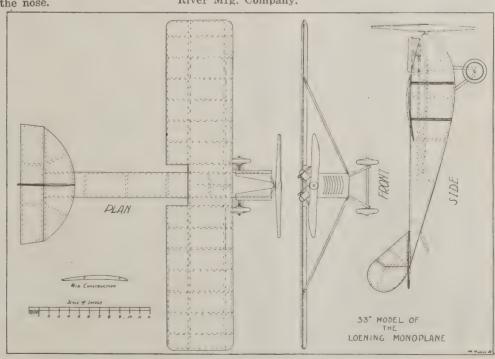
The wings are next in line and little trouble should be encountered in making them. The ribs are cut from thin wood or fibre 1-32 inch thick and holes drilled as shown. These holes should be 1-8 inch to allow 1-3 inch round spars to pass through. The ribs are glued to them at equal intervals as shown by the scale at the left. After the ribs are glued, an edging is placed around the ends of the wings. This edge is 3-32 of an inch in diameter and is glued to the tips of the ribs. The wings are then covered and doped.

The propeller is put on the shaft, and it would do no harm to have the propeller heavy, that is heavier than ordinary to bring the center of gravity more toward the nose.

After putting the propeller in place, test the machine for balance and locate the center of gravity. When this point is determined, place the wing so that the entering edge lies 1 inch ahead of the center of gravity mark, or when the wing is in place the center of gravity will come at a point 2 inches behind the entering edge of the wings.

The model is now balanced to fly and the propeller should be spun in a reverse direction to tighten up the rubber strands and the model gently launched to secure its being in balance. It is best to select a place where the grass is long to cuspion the landing shock of the model. Flights may be made rising from the ground as well.

Full sized complete plans can be had from the Wading River Mfg. Company.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

### "The Aviation Blues"

A parody on the "Alcoholic Blues" as sung by a pilot on leaving the Air Service because of his wife is nervous about his being hurt.
I've got the blues

I've got the blues

I've got the aviation blues

No more planes my heart to claim Good-by nose dives I loved to make good show dives

So long zooming, good-by spins, Oh tell me when I may go back again.

I've got the blues

Since she's amputated my loops. Lordy, lordy, wives are well—you know I don't have to tell

Oh, I've got the aviation blues, SOME BLUES!!

R.H.G.

### Warned!

A Pyrene fire extinguisher dropped from a passing plane, pilot only knowing why, landed at the feet of Rastus, who was superstitious as the rest of this race, caused much consternation, in that darky. "Oh, Lordy, has Ah been that bad that you-all must drop this here symbol from above to tell me where Ahs heading?"

к H.G.

### Starving!

Italy means to starve out D'Annunzio, but it may be a rather hard matter to starve a poet.—Indianapolis News. Or an aviator!



"Mayor Hylan's Sky Cops."-By French in the N. Y. World.

### How a Tail Spin Feels

"Have you ever taken a tail-spin in an aeroplane?" "No, but I've been called upon unexpectedly to make a speech, and I guess the sensation is about the same. Detroit Free Press.

### Drill

It was a dark night at Camp Grant. Footsteps of a horse were heard approaching.
"Halt! Who's there?" barked the rookie.
"Regimental Commander."

"Dismount, Colonel, and advance to be recognized."
The Colonel dismounted and came over to the rookie, who presented arms with a snap.
"Proceed, Colonel," he said.

As he laboriously got back on his horse, the Colonel asked, "By the way, who posted you there?"
"Oh, nobody," replied the sentry, "I'm just practicing."—

American Legion Weekly.

### **Private**

It is all wrong to call a soldier a "private," says a correspondent of the "West's Recall." "There is nothing private about me," he asserts. "I have been examined by fifty doctors, and they haven't missed a blemish. I have confessed to being married and having no children. I have told my previous occupations and my salary. I have nothing in my past that has not been revealed. I am the only living thing that has less privacy than a goldfish. sleep in a room with countless other men and eat with about nine hundred. I take my baths with the entire detachment. I wear a suit of the same material and cut as 5,000,000 other men. I have to tell a physician whenever I kiss a pretty girl. I never have a single minute to myself. And yet they call me 'Private.'"

### Pennsylvania's Legislators Passed Aerial Laws in 1794

Philadelphia.—As evidence of the wide-awake character of the citizens of this city, a press report states that Jack Howard, general manager of the Pennsylvania Aero Service Corporation was arrested here on October 20, charged with violating one of the "blue laws" of 1794 by carrying passengers in an aeroplane on a Sunday. This is the second arrest made under this law.

That even senior officers can appreciate a joke some-That even senior officers can appreciate a joke sometimes is evidenced by the following incident: In giving vent to his feelings on his discharge, an old soldier wrote to his late colonel: "Sir, After what I have suffered, you can tell the Army to go to hell." In due course he received the following: "Sir: Any suggestions or inquiries as to movements of troops must be entered on Army Form 123 XYZ, a copy of which I enclose.—United Service Gazette Gazette.

Having the Senate, we have one form of Air Mastery.— Boston Herald.



# Valspar Plays a Part in Success of Lawson Airliner

"The success of the Lawson Airliner opens up to the commercial world new transportation methods which will eventually save the traveling public incalculable time and wealth. I expect shortly to establish an airline between New York and San Francisco for the purpose of making regular daily trips between the Atlantic and Pacific Coast in 36-hour schedule time.

"Valentine & Company played no small part in the success of this giant airliner by reason of the fact that they supplied us with one of the very necessary materials that go into and help to make an airplane a success. "We used exclusively Valentine Valspar Varnish and Valspar Enamels on the wings, nacelles and fuselage of the Lawson Airliner, and never have I been more satisfied with airplane varnishes and enamels than I have with the Valentine products.

"My 12 years of aircraft experience has shown me the necessity of putting only the best materials in the construction of aircraft, and the fact that I used the Valentine products is proof as to what I think of them."

LAWSON AIRLINE TRANSPORTATION CO.

Alefred W. Lawron



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(Continued from page 198)

ings of the Club, and were the first A. E. F. aviators to go

overseas; and "WHEREAS, The pioneer work of the Club in creating where As, the planet work of the college aeronautic units and fostering interest in aerial college aeronautic units and fostering interest in aerial preparedness in colleges and universities in 1915, 1917 and its helpful advice and guidance were directly responsible for bringing six thousand college men into the Service; and

Air Service; and "WHEREAS, Before and after America's entry in the war, the Club, by means of energetic national campaigns was responsible for securing large appropriations for military and naval aeronautics, and urged unfalteringly the adoption of adequate plans for aerial preparedness:

"WHEREAS, The Club heartily supported the work of the Lafayette Escadrille and Flying Corps, which were organized and supervised by Major Edmund Gros and Lieut. Com. F. H. Allen and generously supported by Mr. W. K. Vanderbilt, all members of the Club; and "WHEREAS, Through the generous offer to pay the

salaries of flight surgeons, amounting to \$23,000 in 1917, when there was no provision for same the Club was of great help in establishing the Medical Section of the U. S.

Army Air Service, which, when put in operation, resulted in saving the lives of hundreds of aviators; and "WHEREAS, The Club organized a Foreign Service Committee in Paris, composed of prominent Americans, members of the Club, residents in Paris, whose high standing in France and personal knowledge of the country method. enabled them to be of great assistance to American aviators at the front and elsewhere and visited the American aeronautic centers in France, and established club houses

aeronautic centers in France, and established club houses and supplied them, as well as aero squadrons at the front. with magazines, books, atheltic equipment, tobacco and other needs, which greatly added to the personal comfort and well-being of the aviators; and "WHEREAS The Club soon after America's entry into the war, when there were no American decorations to be awarded for distinguished service, created the Club's Medal of Honor and Merit and Diploma to be awarded for distinguished service; thereby being the first national American body to express in a tangible way the apprecia-American body to express in a tangible way the appreciation of the American Nation to those who fought at the front for civilization and humanity; and

WHEREAS, It was the Club's efforts that kept the S. Army and Navy aviators flying pay from being

abolished during the war; and
"WHEREAS, During the war the Club, with rare kindwhereas, buring the war the Club, with rare kinds and sympathy, comforted the parents of the aviators who lost their lives or met with accidents, and with great trouble found and supplied information to parents regarding the whereabouts of their sons who were in the

"WHEREAS, The Club created the Airmen's Memorial Fund, for the purpose of erecting a suitable memorial to the Airmen who have died and has taken other steps to honor and perpetuate the names of the airmen who fought and died for the cause of humanity and civilization; and "WHEREAS, The employment of aircraft for general

purposes has been advanced at least one year, because the Club, during the past five years, had the foresight to make plans for the employment of aircraft for transportation, sport, scientific and civil purposes; and
"WHEREAS, The Club contributed in many other ways

not made public and not mentioned herewith to the upour Air Forces and to attaining the final victory over Germany and her Allies, and to the placing of American aeronautics on a sound, permanent basis; be it

"RESOLVED, That we, among the hundreds of others who have seen the great value and benefited through the Club's inspiring patriotism, progressive work and liberal contributions, herewith express our heartfelt gratitude; and, be it further

and, be it further

"RESOLVED, That we hereby pledge our hearty support to the Club in its great work; and further

"RESOLVED, That a copy of these Resolutions, duly engrossed, be transmitted to each and every member of the Board of Governors of the Club and the Chairman of the Committees and those members of the Club and co-operating organizations who have contributed to the Club's splendid work."

### Club Has Membership of 2,800

The Aero Club of America has a membership of 2,800, including three generals in the U. S. Army, five admirals of the U. S. Navy and two hundred other ranking officers of the U. S. Army and Navy. The Club is the sole representative of the International Aeronautic Federation in the United States and alone has jurisdiction over all sporting aeronautic events, and passes on all aeronautic records made in this country.

There are forty Aero Clubs in the United States affiliated with the Aero Club of America, which, with the Aerial League of America, have a total membership of 20,000.

# ALDIAL AGE WEEKLY

ol. 10, No. 7

NOVEMBER 10-17, 1919

10 CENTS A COPY



One of the 16-passenger Farman aerial Pullmans of the Cuba-U. S. Airline, established by the Cuban sportsman, Hannibal J. de Mesa, which is to be exhibited at the Third Pan American Aeronautic Congress, to be held at Havana, Cuba, February 21 to March 1, 1920

Aircraft Demand for Civilian Purposes Large Enough to Support Aircraft Industry on Permanent Basis

ISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY Fintion: Domestic, \$4. Foreign, \$6. Entered as second-class matter March 25, 1915, at the Post Office at New York under the act of March 3rd, 1879



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### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., November 10-17, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, NOVEMBER 10-17, 1919

NO. 7

### "AIRCRAFT DEMAND FOR CIVILIAN PURPOSES LARGE ENOUGH TO SUPPORT AIRCRAFT INDUSTRY ON PERMANENT BASIS," REPORTS COMMISSION OF AERO CLUB OF AMERICA AND AERIAL LEAGUE OF AMERICA. WHICH INVESTIGATED DEMAND IN FORTY-NINE AND FOUND **AIRCRAFT INDUSTRY** \$50,000,000 ORDERS THIS YEAR

HAT the demand for aircraft for civilian purposes is large enough to support the aircraft industry on a perlarge enough to support the aircraft industry on a permanent basis, and the progress of the aeronautic movement is being held back today because of American Manufacturers not being able to make deliveries fast enough to supply the demand from civilian sources, and that the aircraft industry lost business amounting to close to \$50,000,000 this year from individual customers and different countries which were anxious to place orders; are the conclusions reached and given in a report presented to the Aero Club of America and the Aerial League of America today by the Commission which investigated conditions in forty-nine cities durmission which investigated conditions in forty-nine cities during the past eight weeks.

The Commission, which included the leading aeronautic authorities, officials of the Aero Club of America and the Aerial League of America, undertook this exhaustive aerial survey of the United States for the special purpose of ascertaining the extent of interest in civilian aeronautics throughout the United States. For this purpose there were selected as investigators aeronautic authorities who have led the aeronautic movement for the past ten years and, therefore, have a wide knowledge of the subject; and their relations with the financial business sinic industrial and professional interests of the cial business, civic, industrial and professional interests of the different cities are sufficiently intimate as to enable them to secure the fullest information regarding the interest in aero-

secure the fullest information regarding the interest in aeronautics as it exists in the different cities.

The Commission appointed by the Aero Club of America and the Aerial League of America to make this investigation included Alan R. Hawley, president of the Aero Club of America for six years; Colonel Jefferson DeMont Thompson, chairman of the New York Aeronautic Commission; Henry Woodhouse, vice-president of the Aerial League of America and editor of "Flying" and "Aerial Age Weekly"; Major Charles J. Glidden, president of the Aerial Touring Association; Commodore Louis D. Beaumont, president of the Special Commission to Organize the First Aerial Derby Around the World; Sydney B. Veit, secretary of the Foreign Service Committee of the Aero Club of America in France, and Harmon Spencer August. Harmon Spencer August.

This. Commission started from New York on October 10, with the Commission which is organizing the First Aerial Derby Around the World. Arrangements have been made in advance to visit and hold conferences with officials of aeronautic, commercial and sporting organizations of forty-nine

The Commission travelled in a private Pullman car and arrangements were made to have representatives of different cities meet the car sufficiently ahead to permit the represen-tatives of the cities to travel with the Commission and present a report of the aeronautic situation as it exists in each city. This arrangement made it possible for the Commission to learn in advance of the conditions to be found in each city, so that when it arrived at that city it could readily conduct an investigation of the landing facilities for aircraft and

plan the steps which should be taken in each city to organize more extensive aeronautic activities, including their participation in the International and National aeronautic events to be held during the coming year for which a total of over \$2,000,000 is offered in prizes.

The report states that American aircraft manufacturers can

sell ten thousand aeroplanes during the coming year for civilian purposes provided the aircraft industry operates on a business basis as it would do if it wanted to sell automobiles,

motor-boats, yachts or any other commodities. The reporteds, in part, as follows:

"Wherever the Commission went we heard caustic remarks from people who were anxious to acquire aeroplanes and had tried to get promises for delivery within six months. They said that most of the aircraft manufacturare when readily as a serious production of the six manufacturare when readily as a serious production. facturers were unbusinesslike, were inclined to inquire how much money the customer was willing to spend, rather than to quote prices for a given type of aircraft and that, in many cases, they did not even trouble to answer inquiries from customers who wanted to buy aeroplanes for sport, pleasure and transportation.

"A few manufacturers who answered inquiries of prospective customers were frank in stating that they could not make delivery within six months as their entire output was sold for six months ahead.

not make delivery within six months as their entire output was sold for six months ahead.

"Many people were anxious to get aeroplanes to use this year and, finding it impossible to get promises of delivery for aircraft of the improved type, were willing to buy second-hand military planes. But the demand for these planes was so enormous that it was also impossible to get delivery for these, although customers were willing to go to the place where the planes were stored and assume the responsibility of transporting them to the aviation the responsibility of transporting them to the aviation fields in different cities and have expert mechanics as-

semble them. semble them.

"These second-hand military training planes sold fast. The Commission found that in Chicago alone three hundred and eighty aeroplanes had been sold since June, this year, forty-five in Minneapolis, forty-three in Seattle, thirty-eight in Portland, thirty-two in St. Louis, twenty-eight in Kansas City, twelve in Denver, ten in Cincinnati, and from six to ten in each of twenty other cities, making close to one thousand aeroplanes sold in the middle and northwestern cities visited. These planes are all used for passenger carrying and transportation and everywhere for passenger carrying and transportation and everywhere the Commission was told that people ready to buy aero-planes were held back by inability on the part of manu-facturers to make prompter deliveries and supply larger aeroplanes equipped with several motors to use for long distance transportation and flying boats to use on water-

ways.
"Aeroplane dealers in these cities stated they could have sold ten times as many aeroplanes this year if manufacturers had been able to supply the planes. In some

places large automobile dealers have taken up the aeroplane business and stated their readiness to place orders for one hundred machines of each type for next year. One dealer who bought one hundred aeroplanes last June one dealer who bought one fulfilded aeropiales last fulfices sold them all within sixty days and then bought forty more, which he sold, and could dispose of two hundred more if he could get deliveries. A Chicago dealer sold seven hundred and fifty thousand dollars' worth of aircraft parts and supplies."

The extensive use of planes for transportation, surveying, passenger carrying and other useful purposes in the middle and northwest was a revelation even to the aeronautic authorities in the party, who for the past ten years, as the leaders of the aeronautic movement, have at times been considered over optimistic.

"A number of people, including some railroad mag-nates who were interested in establishing aerial transportation lines, actually went begging for quotations on large aeroplanes and dirigibles which would have given the aeronautic industry business amounting to over \$20,000,000, had the manufacturers been in a position to give

000,000, had the manufacturers been in a position to give quotations and make deliveries.

"The Commission also heard complaints from representatives of Latin-American countries and other countries which were ready to place orders for aircraft amounting to not less than \$50,000,000, but were unable to get quotations or promises for reasonable deliveries and wasted months in the United States looking for manufacturers who could take their orders.

"Only a fraction of this aircraft business has been placed with other countries and the manufacturers are still in a position to take advantage of the opportunities to supply aircraft.

"The total amount of business to be had from people who want to buy aircraft for civilian purposes and from the different countries may amount to not less than \$100,000,000 next year, and the American Aircraft Industry can have this business by merely dealing with the situation on a business basis, as manufacturers would have

to do eventually whether they continue to produce aero-

to do eventually whether they continue to produce aero-planes or undertake to produce other commodities. "American manufacturers will have an opportunity to bid for the orders for aircraft to be had from the Latin-American countries and from individuals at the coming Third Pan-American Aeronautic Congress to be held at Havana, Cuba, from February 21 to March 1, 1920. The Cuban Government has advised the Aero Club of American that the product countries have accorded the invitation that the various countries have accepted the invitation to attend the Congress and will send special aeronautic

commissions to Cuba.

"Every facility will be afforded to manufacturers to show and demonstrate their products. The aircraft exposition will be held at the "National Theatre", which is located in the heart of Havana and an opportunity will be afforded to demonstrate the aircraft and motors the actual defined demonstrate the defined and approximately desired demonstrates at the Havana Aircraft by actual flying demonstrate the aircraft and motors by actual flying demonstration at the Havana Airport. Arrangement has been made with the Cuban-American Jockey Club for the use of the race track at Havana which adjoins the Airport so that spectators will witness demonstrations of aircraft from the well appointed race track which will afford them every convenience.

"The sum of \$25,000 has been offered for prizes for contests and exhibitions to be held diving the Congress."

contests and exhibitions to be held during the Congress and, owing to the practical nature of these contests, manufacturers will be able to demonstrate the efficiency of their aircraft, and meters."

aircraft and motors.

The report also points out that there are a number of national and international aeronautic contests to be held during the coming year with over \$2,000,000 in prizes, and the Com-mission hopes that manufacturers will plan to participate in these contests or put themselves on a production basis so as to supply individuals who want to participate in these contests.

"The Commission wishes to go on record as stating that the progress of American aeronautics is at present held back by manufacturers' inability to supply aircraft and that the aircraft industry, as a whole, will suffer unless attention is given to the situation and arrangements are made to supply the demand."

### MAJOR SCHROEDER EXPECTS TO MAKE ALTITUDE RECORD OF 40,000 FEET

A N altitude record flight of 31,800 feet above sea-level made by Major R. W. Schroeder, pilot, with Lieutenant George W. Elloy, observer, was homologated today by the Contest Committee of the Aero Club of America. The record of Major Schroeder, who is chief test pilot of the Engineering Division of the Air Service, was witnessed and certified to by Captain George B. Patterson, who is in charge of Performance, Tests, Computations and Reports for the United States Air Service, and Lieutenant L. E. Pierce, in charge of the Research Department.

In his report, Major Schroeder states that in his next test flight he expects to go above 40,000 feet. His statement reads as follows:

as follows

"This record climb was made with a passenger, and no unusual experiences were encountered, our oxygen worked fine and would have lasted for two hours longer, I had another hour and a half of gasoline and would have reached about 36,000 feet but was forced to quit on account of a broken water line. I came all the way down with a dead engine and landed in our own field. "My next attempt will be in a week or so, this time I will go all by myself which means I can get about 40,000 feet, because I will be able to reduce my load about 200 pounds. I am using a LaPere with a Supercharged Liberty, and it is working just wonderfully. I expect to make some remarkable flights this coming year."

In connection with the homologating of this report, the Contest Committee of the Aero Club of America makes public for the first time the official report of the altitude record made by Capt. Lang in England last January which is found to be 3,000 feet lower than was originally stated. Capt. Lang's official record is given herewith: Report No. M. 247-a On Ceiling Climb on C/6078 D. H. 9 with Napier "Lion" Engine (23746 A. 13082). A ceiling climb was carried out on the above machine with the following load:

the following load:

Special Instruments.. 13 lbs. Heating apparatus..... 68 " 444 lbs. Petrol, 43 gallons.....308 Oil, 6½ gal. (full).... 63 421

Total weight of machine with this load, 3,440 lbs. The machine reached an aneroid height of 30,500 feet in 68 minutes. This can be clearly seen from the attached reproduction of the records of the recording barographs carried during the test. The true height in feet above the ground was 27,350 feet. The results below are given in the usual way, reduced to standard density:

		Rate		Air Speed	
Height	Time	of Climb	R. P. M.	Indicator	Flow
0			1,800		
2.000	1.1	1,795	1,905	85	26.5
5.000	2.9	1,530	1,935	85	24.75
10,000	6.75	1,095	1,960	83	20.25
15,000	12.6	650	1,960	81	18.0
20,000	22.4	340		78	16.5
25,000	44.6	170		70	14.75
28,000	69.8	75		63	12.5

Note: Revolution Indicator Drive broke at 18,000 feet.

(SGD) T. M. Barlow, Major,

Chief Experimental Officer, Aero Ex. St.,

(SGD) T. O'B. Hubbard, Lieut. Col.

Commandant, Aero. Experimental Station.

Mr. Alan R. Hawley is Chairman of the Contest Committee of the Aero Club of America, the members of which are Lieutenant Godfrey L. Cabot, U.S.N., W. Redmond Cross,

Major Albert B. Lambert, U.S.A., Major J. C. McCoy,

U.S.A., Colonel Jefferson deMont Thompson and Henry

Woodhouse Woodhouse



### THE NEWS OF THE WEEK



### Huntington Aeronautic Association Formed

Huntington, Ind.—The Huntington (Ind.) Aeronautic Association has been formed with a capitalization of \$100,000, to deal in aeroplanes and parts, and to conduct a school of aeronautics. Among those interested in the new project are William F. Smith, Harley E. Rittgers, Elbert Sutton, Edward M. Coleaver, Milton W. Strauss, Andy Kaufman, Ben. F. Harrell and J. M. Hicks.

### Ravenna Aerial Company Being Formed

Ravenna, O.—Plans are being made here for the incorporation of the Ravenna Aerial Company. Interested parties include Mayor Bert Redmond, C. R. Francis, Lieut. Logan W. Case, W. A. Case, C. W. Shively and Philip Greenberger. The purpose of the company will be to promote aviation, buy and sell, and manufacture aeroplanes; also make exhibition and commercial flights. They will also maintain a school of instruction in charge of Lieutenant Case, who recently returned from several months' service overseas with Army Air Service.

### Spokane Indian Buys Aeroplane

Spokane, Wash.—Mike Campbell, a wealthy Spokane Indian, has become an aeronautic enthusiast. After one trip in one of the local passenger-carrying planes, he immediately endeavored to purchase a machine on the field. The Indians of the district have gone in extensively for motoring, invariably purchasing expensive machines, and it is but a short step to interest them in aviation. Campbell is more than likely to astonish the members of his tribe by visiting the reservation in an aeroplane.

### Italian Inventor May Make Steam Powered Aircraft Possible

New York, N. Y.—A demonstration of a new boiler liquid has been made here which the inventor, Mr. Cesare Franco, claims will make possible the use of steam engines on aircraft. The liquid vaporizes very rapidly, and after it has expanded in driving the piston, it is collected at the exhaust. Seven per cent by volume is then burned to vaporize new gas in the boiler, the remaining ninety-three per cent in the meanwhile being returned to liquid state in a condenser, and is again ready for use. The inventor claims that the use of this liquid will save considerable weight in fuel and effect radical economies.

### Roosevelt Memorial Fund Helped by Aeroplane Rides as Prizes

Elizabeth, N. J.—In order to stimulate interest in the golf tourney between the Union County Golf Clubs which are being held here to raise money for the Roosevelt Memorial Fund, the first prize winner will be entitled to an aeroplane ride from Elizabeth to Baltusrol. The tourney will last four days. The Suburban Club of Elizabeth, the Baltusrol Golf Club, the Union County Country Club of Crandford and the Roselle Park Country Club are represented among the contestants.

### 6,000 Horsepower Plane for Around the World Flight Designed

Chicago, Ill.—According to a telegram from Henry Woodhouse, a new type of electrically driven aeroplane has been designed here for the coming flight around the world. 6,000 horsepower motors will drive the craft at tremendous speed. It will carry between 75 and 100 passengers. The wing spread is to be 240 feet and the length 180 feet.

### Lawson Air Liner Reaches Chicago

Chicago, Ill.—The Lawson air liner reached here on November 6, carrying eleven passengers, three of whom were women. The flight from Indianapolis was made in two hours. Owing to the muddy condition of Ashburn field, several teams of horses were required to pull the huge aeroplane out of the mud.

### General Sykes, British Controller of Civil Aviation, to Visit U. S.

London.—It is announced that Major-General Sir Frederick Sykes, controller-general of civil aviation in the British Air Ministry, is leaving England for the United States aboard the Mauretania. He is coming to study the situation for commercial aeronautics in the United States and will be met by Commodore L. E. O. Charlton, the British Air Attaché at Washington.

### Aeromarine Boat Reaches Key West After 1,421-Mile Costal Flight

Key Yest, Fla.—C. J. Zimmerman, accompanied by Richard Griesinger, his mechanic, completed on November 5 a 1,421-mile flight from Keyport, N. J., to this city in an Aeromarine flying boat. The start of the trip was made on October 28 and completed in a flying time of 24 hours 45 minutes.

The flying boat, with two others, will be used in an aerial passenger line be-

tween Key West and Havana. The seaplanes will start flying at an early date.

### Navy May Purchase R-38

Washington, D. C.—The Navy Department is negotiating with the Royal Air Force for the purchase of the dirigible R-38. This craft is somewhat larger than the R-34, which visited the United States last year. The R-38 is 694 feet long, 86 feet in diameter, 93 feet 6 inches high, and carries a useful load of 45 tons. It is expected that she will have a maximum speed of 60 knots.

The British Government has offered to train the necessary personnel to man the ship, and if negotiations are completed, it is expected that a number of navy officers and men will be sent to England for training

### Makes First Aeroplane Trip on 101st Birthday

Wabash, Ind.—The distinction of carrying the oldest passenger on record is still being contested for. Reports from Kentucky announce the carrying a mountaineer of 131 years of age, but definite confirmation of the performance as well as the authenticity of the passenger's stated age have not yet been made

as the authenticity of the passenger's stated age have not yet been made.

From Wabash, Ind., comes the definite information that "Grandpa" Vogel, of Berea, Ohio, of 102 years of age, has been taken up by the Service Aviation Training & Transportation Company. Early in July this company carried Mr. Jack Higgins, of Wabash, on his 101st birthday. They are therefore entitled to the distinction of having carried the oldest passenger in Indiana, if not in the entire United States.

### \$15,000,000 Air Service Appropriation Dropped From Urgent Deficiency Bill

Washington, D. C.—The persistent refusal of the House to pass the \$15,000,000



Screen celebrities just before a flight at Syd Chaplin's Los Angeles Aerodrome. From left to right: Marjorie Daw, Mary Pickford, Mildred Harris Chaplin and Charlie Chaplin

supplemental appropriation for the Air Service to the Urgent Deficiency Bill has caused the Senate to abandon its effort. Senator Wadsworth, chairman of the Senate Committee on Military Affairs, senate Committee on Military Affairs, made a strong plea for the adoption of the measure, but Senator Warren, chairman of the Senate Conference Committee, although sympathizing with the position of the Air Service, pointed out that it was best to yield owing to the impossibility of reaching an agreement with the House conferees.

### Handley-Page Biplane Held Under Customs Regulation

New York, N. Y.—The Handley-Page biplane "Atlantic" was libeled by customs officials on November 5 for technical violation of the customs regulations. For the last two years there has been a commission on the general revision of the tariff laws, whose work embodies all sorts of modifications and revisions. The case of the "Atlantic" was taken up to estab-

lish a precedent in handling such cases.

According to Collector of Port Newton, the last description of "ship" on the statthe last description of "ship" on the stat-ute books includes ordinary vessels which float on the water. In the proposed revi-sion the simple addition of the words "or under water or through the air" is aimed is aimed to cover such points as this and be general enough so the aeroplane will come under

the regulations of the statute.

The Handley-Page craft weighs 14,000 pounds unloaded and was classified by the officials in the category of its "material of chief value," which in this case was considered steel. A duty of 20 per cent was paid in order to free the craft for the New York-Chicago express flight.

### Engineering Council Urges Centralization of Mapping Bureaus

Washington, D. C.—The Engineering Council representing the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Electrical Engineers, the American Association of State Geologists, the National Research Council, and the American Association of State Highway officials, has urged upon the President the centralization of National and State centralization of National and State Mapping agencies into a bureau, so that all work may be standardized and adapted for all required purposes.

The U. S. Geological Survey, the U.



Dr. Fred M. Boso, of Tulsa, Okla., uses a Curtiss Oriole to transport himself and a nurse to distant patients

S. Coast and Geodetic Survey, the Engineers Corps, U. S. A., the General Land Office, the Mississippi River Commission, the Survey of the Great Lakes, the Post Office Department, the Bureau of Soils, the Reclamation Service, the Bureau of Roads, the Indian Office, the Boundary Commission, and probably some others are now independently engineering. some others are now independently engaged in mapping work.

# Washington Aviator Seeks to Make New Altitude Record

Newport News, Va.—E. W. Hubbard, piloting, and S. W. Cogswell, designer and observer, are making a second attempt to establish a new two-man altitude record at the Curtiss Field here. A specially designed triplane powered by a new style of engine is being used. By the use of extra large valve area and double exhaust, it is claimed that one horsepower is delivered for every 1.6 pounds of engine weight.

### Oklahoma Agricultural and Mechanical College Starts Aero Course

Stillwater, Okla.—The Oklahoma Agri-cultural and Mechanical College has se-

Professor Alexander Graham Bell's hydro-boat which has a speed of 71 miles per hour

cured from the Air Service section of the War Department almost \$65,000 worth of aviation equipment and will be pre-pared within a very short time to give a course of thorough instruction in the various branches of aeronautical engineering. This course, at least for the coming year, will be under the direction of the school of engineering of the college and will include ground instruction, pilot training, radio work, aerial photograph and air gunnery and hombing graph and air gunnery and bombing.

The air service section has sent to the college a list of material which will be shipped at once. Some of the items included are:

Three standard aeroplanes, first type, for primary training; one Curtiss JN-H aeroplane; one Le-Rhone 80 horsepower aeroplane; one Le-knone su norsepower motor; one Gnome monosoupape 100 horsepower; one Hall-Scott (vertical type, four-cylinder 90 horsepower) motor; one Liberty 12 motor; four propellers, various makes; one Liberty generator; four magnetos, various makes; one Curtiss fuselage; one Curtiss upper and lower wings; one complete tail assembly; one Lewis machine gun, aerial type; one Marlin machine gun, aerial type; one Vickers machine gun, aerial type; one Browning machine gun, aerial type; one scarf mount for Lewis machine gun; one latest model synchronized firing mechanism; one 35 mm, aviation Mark I signal pistol; sets of tools for various motors; speed indicators; altimeters; barographs; tachometers; one L-type camera, plete with suspension, for aerial photography; bombing and aerial gunnery equipment and ammunition, textbooks and hundreds of minor pieces of sundry equipment.

A landing field to be known as White-hurst Field has been set aside for per-manent use. A new and fully equipped laboratory for engine instruction is being prepared.

### John D. Ryan Before Congressional Investigating Committee

New York, N. Y.—John D. Ryan, Director of Aircraft Production during the war, testified on October 29 before the Congressional Sub-Committee investigating alleged charges of graft in connection with spruce production and railroad contracts in the Northwest. The railroad which was built under one of these contracts connecting the Chicago, Milwaukee and St. Paul Railway with the Northern Pacific and the Great Northern was recently placed at a salvage valuation of \$750,000, but had cost \$4,000,000 to construct. The value of the spruce served by this railway is estimated at \$23,000,000.

Representative Walter M. Magee, one of the investigating committee, was of the opinion that this represented misuse of public funds. Mr. H. E. Byram, former president of the Chicago, Milwaukee and St. Paul, testified that this line was of no value to the railways involved. However, since Mr. Ryan approved this contract at the same time that he was a director of the Milwaukee system and president of the Montana Power Company, and since the railway's value fell considerably below its cost, it was considered necessary to investigate the matter. Mr. Ryan sharply denied all personal interest in the matter, stating that the railway was constructed in order to expedite the shipment of vitally needed spruce for aircraft. Nothing has developed from the investi-



### How to Ship Exhibits to Havana for Third Pan-American Aeronautic Exposition

At the request of aircraft manufacturers, the Cuban authorities at New York have arranged to supervise and facilitate the shipping of exhibits to Havana, Cuba, for the Third Pan-American Aeronautic Congress and Exposition to be held from

February 21 to March 1st.

Extensive artistic exhibits, including trophies, models of famous aircraft, photographs, maps, films, and instruments, are being sent to Cuba by the Aero Club of America and the Aerial League of America, and the Cuban authorities will arrange to send aircraft exhibits at the same time.

Manufacturers wishing to make arrangements for shipping exhibits should apply to Mr. Victor Hugo Barranco, Room 604, 280 Madison Avenue, New York City.

New York-Toronto Aerial Passenger Service Plans New York, N. Y.—Merrill K. Riddick, son of Representative Carl W. Riddick of Montana is leaving for Toronto to se-cure the first aeroplane for the contem-plated New York-Toronto service. Riddick has just resigned from the aerial mail service in order to associate himself with the Adams Aerial Transportation Company of this city. It is planned to maintain a daily schedule in aeroplanes carrying from six to sixteen passengers. A series of passenger lines is to be established in the South.

### Aerial Sightseeing Service at San Antonio

Stinson Field, San Antonio, Tex.-W. T. Atkinson, an ex-army aviator, has organized an aerial sightseeing service over San Antonio. A fifteen-mile flight in a Curtiss biplane from Stinson Field over San Antonio and the old Spanish missions "San Jose" and "Conception," back to Stinson Field, will be made regularly weekday passengers every for Sunday.

A limited number of students will also be given flying instructions. Lieutenant Atkinson was an instructor in the Air Service for a year during the war, being stationed at Carlstrom Field, Arcadia, Fla.; Brooks Field, San Antonio, Tex.; Rich Field, Waco, Tex., and Love Field, Dallas, Tex., and has taught a large number of avistors to the

ber of aviators to fly.

Cincinnati Aircraft Company Organized

Cincinnati, Ohio.—The Cincinnati Aircraft Company was recently organized here under the laws of the State of Ohio. company will establish at Cincinnati one of the most modern commercial landing fields in the country. A warehouse and salesroom has been purchased for the sale of various types of planes. A temporary training field will be opened at Turkey Bottoms, near here, pending the com-pletion of the main field.

Charles E. Lay is president, Archibald Fleming vice-president, and Martin Held secretary and treasurer of the new com-

Curtiss Activities in Washington Washington, D. C.—The Curtiss Aero-plane and Motor Company has sent a number of new Curtiss aeroplanes to Washington to conduct exhibition and passenger-carrying flights. The "Eagle", passenger-carrying flights. The which was first demonstrated at Mineola recently, has carried many important government officials, Congressmen, Senators, Army and Navy officers. A number of Curtiss "Orioles" are also taking up passengers and making stunt flights over the Capitol and the Washington Monument. A Curtiss "Seagull", the three-passenger type of flying boat, reached here on November 5, after a five and a half hour flight from Port Washington, Long Island.

In connection with the Florists' Convention, which is pushing the slogan "Say It the fleet of Curtiss Com-With Flowers, mercial Fleet made a flower-bombing raid

over the city.

Dayton-Wright Plant May Be Pur-

chased for Experiments
Washington, D. C.—A bill was introduced in the House of Representatives and referred to the House of Representatives authorizing and directing the Secretary of War to acquire for use as an aeronautical experimental and engineering plant the Dayton-Wright plant and the 33-acre plot on which it is situated at a cost not to exceed \$390,090.80; the Moraine tract, adjoining, 836 acres, \$1,066,636.94, and a third adjoining tract of 716 acres at a cost not to exceed \$519,648.50. Ohio Flying School Organized

Akron, O .- The Ohio Flying School and Transportation Co. was organized here recently for the purpose of conducting an exhibition and passenger-carrying service. The incorporators, Edward L. M. Anthey and Scott M. Worley, have capitalized at \$100,000. The company has already secured a flying field.

### Aircraft Firm Organizes in Connellsville

Connellsville, Pa.—A number of Connellsville business men have incorporated the Windell Commercial Aeroplane Company and are establishing a landing field at the west side of the town on a perfectly level tract of 43 acres. Large hangars will be established for the accommodation of commercial planes with every facility.

The officers of the company are: President, John Hunker; secretary and treasurer, Roy Windell; directors, Lieutenant Herbert Duggan, Roy Windell, E. Sweeney, John Hunker, Charles Kunnish and S. D. Frisbee.

### Bearings Company of America Building New Factory

Detroit, Mich.-At a recent meeting of Detroit, Mich.—At a recent meeting of the board of directors of The Bearings Company of America of Lancaster, Pa., it was decided to increase the Thrust Bearing factory facilities of The Bearings Company of America, and a new building of the latest type of construction is to be erected in the immediate future, which will give approximately 60,000 additional square feet floor space when the building is completed.



Delivering the first freight cargo at the Curtiss Field in Buffalo for transportation to New York in a Curtiss JN-4D

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aeral Mall Servee
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Ciark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Maii Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M, Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T .Lewis Walter H. Stevens Herbert M. Crader Charles I. Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warchouse Samuel C. Eaton
Robert H. Ellis
James H. Knight
Elmer G. Leonhardt
Paul S. Oakes
Paul W. Smith
Frederick A. Robinson
Max Miller
F. A. Nutter

### 114 Minute Record for New York-Washington Mail Plane

Washington, D. C.—Pilot Eaton broke the air mail record for a non-stop flight between Belmont Park and Washington. He left Belmont at 8:47 A.M. on September 26 and arrived at the capital at 10:41.

This is the fastest time in which the flight has been made since the stop at Philadelphia has been eliminated from the New York-Washington air mail run.

### Transcontinental Aerial Mail Soon Says Praeger

Washington, D. C.—Transcontinental aerial mail routes will be established in the near future, possibly as early as January 1, Otto Praeger, Second Assistant Postmaster-General, told the House Post Office Committee on November 7, adding that the department also contemplated an aerial mail route to Alaska. Mr. Praeger said a number of cites had offered free landing fields and other facilities.

### Two New Pilots in Aerial Mail Service

Washington, D. C.—Two new pilots for the aerial mail service were recently assigned to duty on mail routes, E. G. Leonhardt, formerly an army aviator stationed at Bolling Field, has been assigned to regular duty on the Cleveland-Chicago run.

Walter J. Smith, army aviator, who saw service over the battle line in France, has been temporarily assigned to College Park on the Washington-New York run.

Lieutenant Leonhardt, a crack army flier, was trained at Gerstner Field, Lake Charles, La. Gerstner Field during the war was devoted to fast scout plane training and was the leading scout field in the country. After being assigned to Bolling Field, Lieutenant Leonhardt was made test pilot, the most trying and hazardous of all air assignments.

Lieutenant Smith is credited with more than 1,000 hours flying time in this country and in France. He was on duty over the battle lines for some time.

### Chicago-New York Aerial Express Service Discussed by Government Officials

Chicago, Ill.—A daily express delivery service via air between Chicago and New York, with stoppages at intermediate points, is the plan now under consideration by the Government as a means of increasing the efficiency and utility of the present aero mail service.

The project was discussed on November 4 at a conference between post office officials, members of the South Park Commission and officers of the Chicago Association of Commerce. According to the plan, the express service will be conducted in conjunction with the aerial mail delivery. Several large Martin bombing planes are now said to be under construction by the Government, which will enable both mail, express and valuable bank papers to be carried between New York and Chicago in ten hours.

The new machines will be equipped

with two 400 horse-power Liberty motors capable of making a speed of 125 miles per hour. The cost of each plane is estimated at \$40,000.

### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—WESTERN DIVISION

Monthly Report of Operation and Maintenance

AUGUST, 1919

-	1 1				uel,			· med.					SERVICE AND UNIT COST							
Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile		
63 64 66 67 72 73 74 75 76 81	\$137.87 310.75 121.54 34.94 234.95 219.74 481.62 316.56 25.08	\$24.57 42.65 21.15 2.10 33.90 39.90 75.30	\$106.69 106.69 106.69 106.69 106.69 106.69 106.69 106.69 106.69	\$75.42 75.42 75.42 75.42 75.42 75.42 75.42 75.42 75.42 75.42	\$32.83 32.84 32.84 32.84 32.84 32.84 32.84 32.84 32.84	\$96.16 96.16 115.42 75.18 104.73 97.39 52.15 52.15 96.17 52.15	\$99.12 263.51 69.46 42.99 203.25 164.32 371.75	\$294,97 386,61 354,25 114,84 313,64 331,87 422,25 157,53 317,07 135,06	\$115.85 15.65 62.45 2.05 21.70 119.31 33.09 90.25 100.00	\$50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00	\$99.60 99.60 99.60 99.60 99.60 99.60 99.60 99.61 99.61	\$1,133.10 1,479.87 1,108.82 636.65 1,276.72 1,337.08 1,800.71 574.23 1,500.55 688.30	439 1,025 409 123 764 708 1,594 1,007 76	hr. min 15 57 42 33 11 09 6 52 32 48 26 30 60 04 42 58 1 46	1,400 3,725 1,550 750 3,025 2,375 5,910 3,350 211	3.1 3.6 3.7 6.1 3.9 3.3 3.7	\$70.80 34.80 99.00 92.40 38.40 50.40 29.40 34.80 389.40	\$0.81 .39 .72 .84 .42 .56 .31		
Total	\$1,883.05	\$289.44	\$1,066.89	\$754.20	\$328.38	\$837.66	\$1,491.93	\$2,828.11	\$560.35	\$500.00	\$996.02	\$11,536.03	6,145	240 37	22,296	3.6	\$47.40	\$0.51		

### **AERIAL PHOTO-TOPOGRAPHY**

### By R. PRESTON WENTWORTH

Photo-Topographic Engineer (Formerly Assistant, Department of Geology and Geography, Harvard University)

PHOTOGRAPHY, as applied to-day to map making can be traced back to the early days when architects of the old world utilized the camera for its perspective values. Gradually this use developed so that plants and finally topographic maps were produced from photographs taken on the ground. From this success it was realized by those who saw the first photographs taken from free balloons that somewhere in the distant future, when unencumbered by the practical difficulties of aerial navigation of that day, aerial photography would be of countless value in the preparation of maps. To this end the United States gave to the world in 1903 the wonderful achievement of the Wright Brothers in their practical solutions of the problems of flight. This pioneer development received a terrific impetus in the World War when it was seen that the mastery of the air was the deciding factor in that colossal struggle, and that, to whom that mastery belonged, also belonged victory. Throughout this maelstrom aerial photography played a heroic part upon which depended a large share of the successes of the arms in the field.

As a science, aerial photography entered the war a practically unknown product and emerged a complete and proven success. Naturally the application of aerial photography to map making during the war was a problem of extreme importance and all agencies, especially the Air Service, upon which the responsibility for its solution logically rested, bent every effort to solve. As war time is not ever a constructive period the accomplishments of all who attempted to attack this problem can be considered as limited to the correction of existing maps as far as the accurate location of the data obtained is concerned and to the production of a new type of map called a "mosaic" by lay observers. The latter map is not accurate, neither does it even give a proportional relationship of objects but it gives a picture plan of that part of the earth's surface included and does show

a general relationship of features. Uncontrolled even, the so-called "mosaic" is certainly a surveying panacea in inaccessible or unexplored regions or in regions where accuracy is of no pressing import or where data showing the relationship of physiographic features is of great value from the point of view of natural resources or future development of the country. The maker of maps considers his product as a clear and intelligent representation of the earth's surface to scale but he has been brought up to know, and make, and read maps so that his point of view is extremely biased. To thousands of others less fortunate than the map maker but who are dependent on the map maker's product to guide them, the map is an unintelligible jumble, oftentimes primarily because the map is a compilation of signs tending more or less to indicate their natural derivation. On the other hand a photo-lithograph of a group of aerial photographs properly controlled will prove a boon to the user of maps, for he has before him the features exactly as they appear and for his purposes accurate enough in location. Naturally it is expected that the user of the photographic map will study it, for aerial photographic interpretation alone will bring out the fund of information lying before him and, because it is a photograph, is not a prima facie assumption that its use requires no exertion of intelligence on the part of the user. It does, however, through its more expressive readability, reach a greater multitude of persons than the older forms of maps and therefore is a distinct gain and addition to the progress and comfort of the world. This new form of map in no way precludes or even eclipses the conventional and established system of surveying as yet, but is an asset of untold value and, as pointed out, a boon in many respects. The customary methods of map production will still have their uses and may assist the newer method considerably. Cooperation in this respect will reduce the otherwise necessary activities of both and the result



Accuracy and Economy are important factors in aerial surveying of cities and timber lands

be a very perfect product with much less exertion than formerly to say nothing of less guesswork.

Aerial photography as an exact science is entirely possible and even with the present point of development of aircraft, a practicable means of producing precise maps. Several systems of aerial surveying have been worked upon, varying primarily in the type or position of the camera used, because fundamentally there is no basic differentiation, as the principles involved are not new and are in fact the same as those in terrestrial photo-topography which has been sucas those in terrestrial photo-topography which has been steen cessfully used throughout the world for a great many years. Dependent on this primary variation in the systems is a vast complex or simple effective amount of apparatus to accomplish the result desired as the case may be. However, in the application of these principles in a new way, one is brought face to face with hitherto unsolved problems. The

solution of these problems has been occupying the attention

irregularities such as mountains and valleys substituted for our ideal flat surface. This relief at once nullifies any computations that are not made after the elimination of its effects. No method has yet been devised that entirely counteracts this source of error except for small areas of minor relief. In regions of extremely low relief this source of error can be neglected for practically all maps, but until this problem is solved aerial surveying will be confined to comparatively narrow fields of operation.

The next proposition we meet in contradistinction to our idealistic assumption brings us to several problems. The dealistic assumption brings us to several problems. The airship is moving rapidly in an unstable medium. The speed with which the airship moves precludes our pinhole and we are forced to substitute a lens in its place to get the proper speed of exposure. With the lens we get distortion in the photograph due to the physical inability to grind the glass to certain graphic curves added to problems of the



Process of compiling an Aerial Photographic Map

of those interested with photographic mapping from the air for some time and these problems are still far from being solved by any. The system which will eventually result will necessarily have to be simple and free from complication on account of the costs which are attendant upon this method of surveying, although in many cases these costs. when government operated, can be ranged over a considerable number of factors benefited, but, in any event, the ground

able number of factors benefited, but, in any event, the ground costs must always be kept at a minimum.

A treatise on the technical details of aerial surveying would fill a good sized volume and be beyond the scope of the present article, but in order that full comprehension may be given of the progress and trend of this new science, a brief outline of the composition and difficulties of the subject will not be amiss. Assuming the theoretically ideal condition of flat surface photographed through a pinhole from an aeroplane in the air with the photographic plate and the flat surface in parallel planes, then a true map of the flat surface has been produced on the sensitized medium at a scale dependent on the distance of the pinhole from at a scale dependent on the distance of the pinhole from the ground and on the focal length of the camera. Outside of the fact that one gets varying scale in his aerial photographs not one other of these conditions can be produced in reality and so it is seen that combating errors and problems is the beginning of aerial surveying development.

Disregarding entirely any curvature of the earth's surface

which is negligible except over large areas, there are many

glass itself. This distortion is circularly symmetrical about the center of the picture. Then we supposed the sensitized material, as the plate or film, as parallel to the flat surface, material, as the plate or film, as parallel to the flat surface, but it is in the camera attached to the airship and the latter is in an unstable medium, to wit, the air. The airship pitches and rolls, and loses altitude by dropping into an "air pocket," so that the plate or film is hardly ever even parallel to our surface which is actually in relief. This, of course, causes variations in scale even within an individual picture and adds to the lens distortion, the distortion due to the lack of verticality of the principal plane of the camera. This last difficulty is a serious objection to those systems which use "oblique" aerial photographs or multi-lens cameras including lenses set at fixed angles from the vertical, for the reason that as far as precision mapping from aerial photographs is concerned, the more distant portions of all oblique or angular views, whether restored or computed in their origangular views, whether restored or computed in their original form, are inherently erroneous. This source of error inal form, are inherently erroneous. This source of error or perspective distortion is directly dependent on the flying altitude and increases with the increase in the angle of the camera axis, and tilt distortion in a single lens camera presents a sufficiently bad problem to cope with, to say nothing of the added complication introduced by having this error appear in oblique photographs too. The multi-lens camera must be flown low to get accurate results, as has been shown and this reduces the area covered and increases the danger in flying. Therefore the complication of apparatus which is (Continued on page 265)

### THE B-G SPARK PLUG

recent remarkable performances of the B-G Spark Plugs in the Toronto Race and the Transcontinental Race has proved them to be an important advance in spark plug design and manufacture. Improved reliability of the ignition system means increased safety and better performance.

The advance in the design of the B-G Plug consists of its self-cleaning feature which is obtained by a high pressure air blast directed over the sparking points, on all four strokes of the engine cycle.

On the compression stroke of the piston

pressure is accumulated in the body of the plug in the space provided above the sparking points. The air enters the chamber through the four holes at the base of the plug. These holes are drilled at such an angle that such oil as may find its way through the four apertures (19) is forced into the oil pocket immediately above them formed by the body of the plug and the lower point of the thimble (11 P.) (11-B).

The compression chamber of the plug In compression chamber of the plug is considerable larger, however, as it extends far up into the plug to the mica insulation held in place by the spindle (14) and crushed together at high pressure by packing cone (12-B).

At the start of the power stroke the

spark occurs and the recession of the piston permits the escape of the accumulated pressure, augmented by the heat of com-bustion and spark. The oil and pres-sure in the oil pocket passes, through the sure in the oil pocket passes, through the holes at the bottom of the plug; the pure mixture in the inner section of the chamber, deflected by thimble (11-B) passing at great pressure over the sparking point. The operation is repeated on the exhaust and intake strokes of the piston.

Many experimental plugs were required before the correct size of the holes for the base of the plug was found, for they determine the pressure accumulated in the plug and also the direction through which that pressure is released. If the holes are too small insufficient pressure to blow all oil and soot from the plug points is obtained. On the other hand, too large holes result in the pressure being forced through the holes instead of passing at the contact points.

The mica insulation used is specially treated and is packed to the utmost tightness by means of the packing cone used in the assembly. A cooling chamber is provided on the outside of the plug which lowers the temperature of the thimble

(11-B)

The plug can easily be dissembled from the body which screws into the cylinder

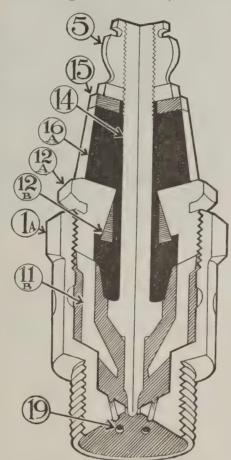
head, exposing the sparking point and insulation for inspection and cleaning.

In the recent New York-Toronto and New York-San Francisco races, the marvellous performance of the B-G spark plugs proved the soundness of the new principle of construction. The gruelling conditions to which they were subjected gave an opportunity for instructive com-parisons of their efficiency, with those of the other types which are approved for use on military aircraft by the War Department.

Four of the De Haviland planes of Colonel Claggett's squadron which en-tered in the New York-Toronto-New York race were equipped with B-G spark plugs. Each one of these plugs went through the race with a perfect performance. This record was equalled by Lieutenant May-nard, the winner of the race; Major Schroeder, Sergeant Coombs and Lieu-tenant Kirkpatrick.

At Hazelhurst Field after the race, several plugs were removed from a number of the aeroplane engines and examined. It was found that the insulation on each of the plugs removed was perfectly clean due to the effective scavenging action. The Army Reliability flight requiring

two crossings of the continent, a distance



Sectional view of the B-G Spark Plug Parts list: 1A—Body, 5—Terminal Nut, 11B— Spindle, 12A—Assembling Nut, 12B—Packing Cone, 14—Spindle, 15—Washer, 16A—Mica Core, 19—Induction Holes

of approximately 5.400 miles, furnished another opportunity to demonstrate the success of the B-G spark plugs. Lieutenant Maynard, the winner of the race, obtained a perfect performance from his set of B-G plugs. Owing to the breakage of the crank-shaft, he was forced to change engines at Wahoo, Nebraska, and therefore was unable to finish the race with the original set of B-G plugs. But at the time of the break-down, the plugs had given no trouble whatever and were in perfect condition.
Lieutenant-Colonel Reynolds used a set

Lieutenant-Colonel Reynolds used a set of B-G plugs which were installed at Langley Field. Virginia. He flew these to Mineola, then across the continent and back, and finally returned to Langley Field. No change of plugs was required and they were functioning properly on their return to the home field.

Cantain Donaldson's and Lieutenant

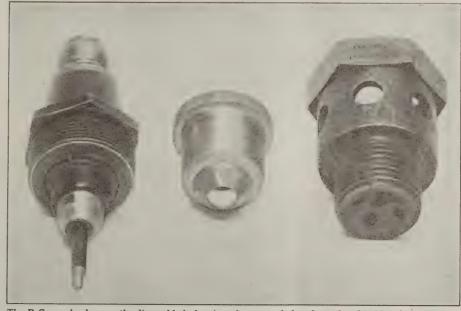
Captain Donaldson's and Lieutenant Manzelman's B-G plugs also gave perfect account of themselves despite the length of the flight and the serious weather conditions encountered.

The official report of Lieutenant-Colonel R. S. Hartz's "Rim" flight states that a set of H-G plugs gave a perfect performance in that gruelling 9,283-mile flight. The set of plugs used were tested for 30 minutes in a D-H prior to the flight. While on the flight they had 24 hours 25 minutes warming time and approximately 114 hours 45 minutes flying time—a total of 140 hours.

time—a total of 140 hours.

The Martin biplane, with the exception of two nights, was out of doors without protection between July 24th to November 9th. After standing for 31 days at Jay, New York, where it was held for repairs, the left motor was cranked on the first try and the right motor started on the second try, although the engines had been idle in the open under all possible climatic changes during that period. Not once during the entire flight was a spark plug miss recorded and never was difficulty in starting the engines attributable to the failure of the ignition system.

It is apparent that the new features of design embodied in the B-G plug are important improvements, and their success in the recent competitions justifies the conclusion that they will function reliably and faithfully in the highest compression engines used on aircraft and reduce by a large percentage the renewals required.



The B-G spark plug partly dissembled showing the core of the plug; the thimble which deflects the air to the sparking point; and the body of the plug, with the apertures leading to the compression chamber at the base

### THE SIEMENS TYPE D IV SINGLE SEATER FIGHTER

DURING the latter part of the war, a good deal was heard of the Siemens Single-Scater, but little reliable information concerning this machine was available. It was said that it had an extraordinarily good (for a German) climb, manœuvred exceptionally well, and was strong enough to be "spun" with the engine running. The engine was thought to be a Siemens rotary, said to give exceptional power for its weight, and to be particularly good for altitude work. The reports, as is so often the case in such circumstances, differed greatly, and varied from the statement that this machine was no good at all, to the opinion that it was better than anything we had at the time. As frequently happens, the truth, judging from the following description, which is translated from the German aviation journal Flugsport and reprinted from Flight, is somewhere in between the two extremes. The machine is undoubtedly one of the best German machines of which detailed particulars are available, but at the same time does not come up to our best. Thus Flugsport:

In January, 1918, the Siemens-Schuckert Works brought out, in a competition for this class at Adlershof, a single-scater fighter known as the D III. This machine, which had a Siemens-Halske rotary motor with 11 cylinders, had a climb that greatly exceeded the specifications of that time, and had at the same time a sufficient horizontal speed and good manœuvrability. In order to improve upon this type, the speed was increased at the cost of climb, and the shape and section of the main planes were altered accordingly. The new machine, type D IV, is shown in the accompanying illustrations.

The total span of the D IV is 8 m. 35, with a chord of 1 m. There is neither dihedral nor sweepback. The weight of the machine empty is \$25 kg.

Concerning the Siemens rotary engine, only a brief reference will be made to this, a more detailed description being reserved for a future occasion. The 200-h.p. 11-cylinder motor is a development of the previous 9-cylinder engine of 110 h.p. It differs f

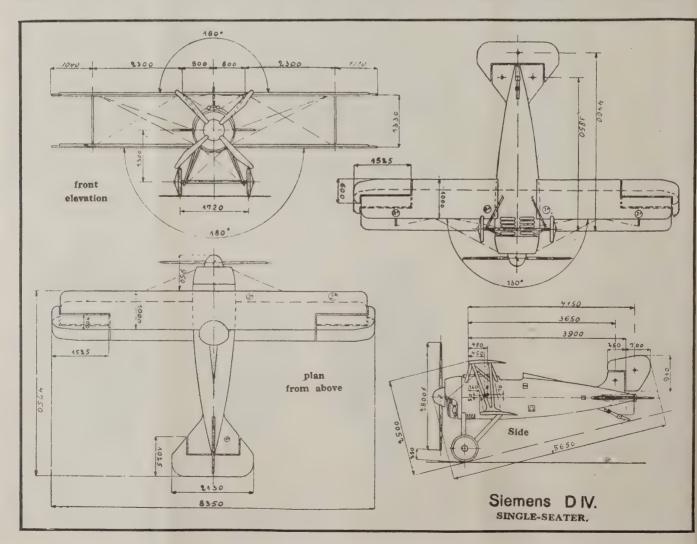


The Siemens-Schuckert Single-Seater Type D IV

stationary and the cylinders revolved, in the new engine the crankshaft revolves in one direction and the cylinders in the opposite direction. The cylinders revolve at the rate of 900 r.p.m. in one direction, and the crankshaft makes 900 r.p.m. in the opposite direction. This is equivalent to

an engine speed of 1,800 r.p.m., while the speed of the airscrew is only 900 r.p.m.

The arrangement of having the two masses rotating in opposite directions is attended by the following special advantages: The low speed of the airscrew results in a better propeller effi-



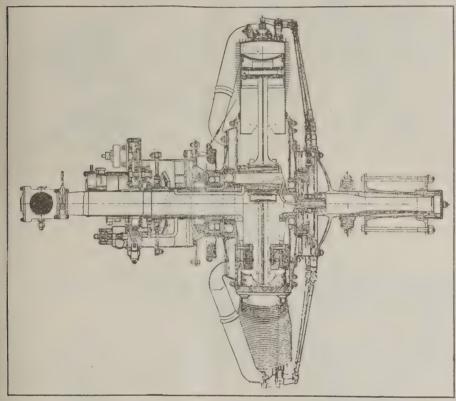
ciency, while means a greater useful thrust. On account of the low speed of the cylinders the centrifugal force is smaller, which makes for reliability. The high virtua speed of the engine (by having cylinders and shaft revolving in opposite directions) results in greater power and lighter engine weight. On account of the low speed of the cylinders, air resistance is decreased, resulting in a better efficiency. By having the masses revolving in opposite directions gyroscopic force is approximately eliminated, which is an advantage for manceuvring. The fuel consumption is far lower than that of any other rotary, and is about the same as that of stationary engines.

gines.

The Siemens rotary can be throttled down from

The aluminum cowl round the engine ensures proper cooling and prevents the used oil from being thrown out. The oil tank is mounted behind the engine in order to protect it from the cold, and a short distance behind it is mounted the fuel tank which is arranged for gravity feed. The two tanks are bolted together, and may be put into and taken out of the machine as a unit. In later types the oil tank is built with double walls, the space between which is packed with heat-insulating material so that the oil, even at the greatest altitudes, retains its proper consistency.

The air screw is a four-bladed tractor, with the four blades glued together in one plane. Its diameter is 2 m. 80 and the pitch 3 m. 90. The



Transverse section of the Siemens-Halske Rotary Engine

900 r.p.m. to 350 r.p.m. The cylinders can be easily removed, and by fitting dual magnetos the reliability is increased. The engine can be started by means of a hand-operated magneto. Both inlet and exhaust valves are mechanically operated, and the engine is over-dimensioned, and consequently suitable for work at great altitudes. The normal brake horsepower is 200 h.p. and the maximum power 240 h.p., for a total engine weight, ready for running, of 194 kg. This gives a weight per horsepower of 0.81 kg. If one at the same time bears in mind the low speed of the airscrew, resulting in a good efficiency, of 68 per cent. or so, the value of the engine will be apparent. The value of the ratio

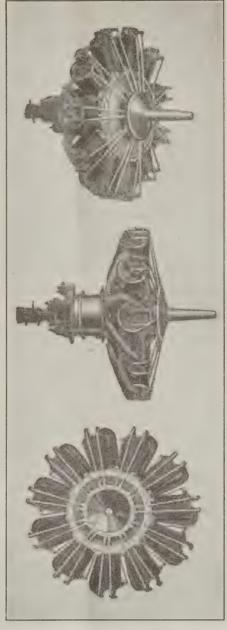
lbs. weight of engine + weight of screw' should be very good.

The engine is hung on its three supports in a wrought-iron frame, which is attached by suitable fittings to the four longerons of the fuselage. Later types are improved by making the engine quickly removable with its cowling arrangement.

four-bladed screw, as shown by experiments, has certain advantages over the two-bladed, without, in the present case, having a lower efficiency than the latter. Thus the under-carriage is lower, which facilitates landing at the high speed of this machine.

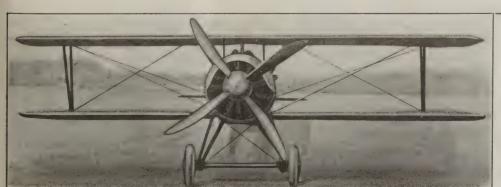
which facilitates landing at the high speed of this machine.

The fuselage is built of three-ply wood, and is designed for the lowest possible head resistance. The framework is formed by a series of transverse formers or bulkheads and four pine longerons, and to this the three-ply planking is tacked. Of particular interest are the diagonal formers, running from bulkhead to bulkhead. These give great rigidity to the structure. Growing out of the main body and built integral with it are the vertical fin and horizontal tail plane, as well as the lower fin, which forms a support for the tail skid. The tail plane, which is of the symmetrical type, is set at an angle of incidence of 0 deg. while the vertical fin is cambered on one side only, in order to counteract the turning moment caused by the propeller torque. To the tail plane is hinged in the usual manner the one-piece, balanced elevator. The rudder is placed wholly



Three views of the Siemens-Halske Rotary Engine. The cylinders and crankshaft revolve in opposite directions

above the elevator. Both rudder and elevator are built up of steel tubes with ribs of sheet steel, and the control cables, which are in duplicate, are so arranged as to nowhere pass over pulleys. The pilot's seat is mounted on duralumin tubes and is adjustable in two directions. The safety belt is attached to the upper longerons via coil springs. The interior of the pilot's cockpit is equipped with the usual instruments: Revolutions-counter, compass, altimeter, throttle levers, switches, magneto switches and petrol tap, etc. The control lever carries at its upper end a



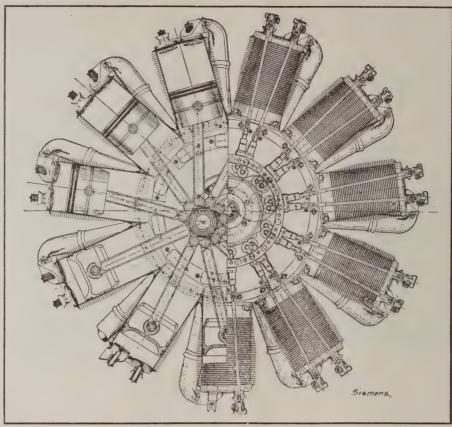
Front view of the Siemens Single Seater, equipped with a 200 H.P. 11 cylinder rotary engine

handle of the type that has been standardized by the German authorities (Heeresverwaltung), and the left side of which is arranged as a throttle lever. By a special locking arrangement, the control lever may be locked in any position. The longitudinal rocking shaft, which is forked round the control lever, carries at its front end a double crank for the aileron control. The latter is in the form of steel tubing throughout in order to minimize danger of damage by bullets.

To the front part of the fuselage is attached the undercarriage, which is built of steel tube throughout. It is held together by a cross tube behind the axle and by diagonal bracing in the rear bay only. The wheel axle, which is a nickel chrome steel tube of 55 mm. diameter, is slung from the struts by coil springs wrapped around the axle. As circular section tubes are employed for the undercarriage struts, these have been streamlined with sheet aluminum. The upper plane is in one piece, and has spars of the box type, the spars being made by spindling out two halves to the desired section. Where struts, etc., occur, the spars sering made by spindling out two halves to the desired section. Where struts, etc., occur, the spars are left solid. The ribs are built up of webs of 1.5 mm. three-ply wood, with flanges of pine. The ribs, which are placed 160 mm. apart, are carefully secured to the spars by small blocks of wood, glued on. The internal wing bracing is in the form of steel tube compression struts and steel wires. The wing fabric is stitched to the ribs. All the wing spar fittings are so designed as to surround the spars, thus avoiding piercing. There are four ailerons of the balanced type, which are hinged to the rear spar. The ailerons are operated by steel tubes lying inside the plane, an arrangement which in addition to the advantage already referred to of safety against bullets, gives less head resistance than cables placed on the outside of the wing; this is evidently a "crib" of the Nieuport type of control. The interplane struts are

nent set or stretch after the very severe test flights.

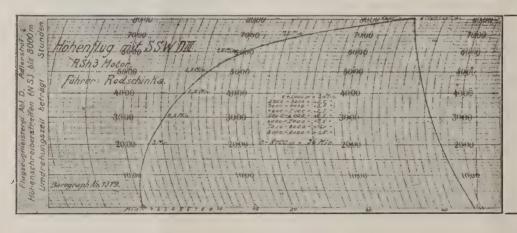
One of the accompanying illustrations shows



Part sectional view of the Siemens-Halske Rotary Engine

a barograph record taken under official tests and with the machine carrying its service load of 195 kg. The climbs are only to be described as exceptionally good. The speed and manœuvrability has drawn favorable comment from all quarters, and the machine has become a leading weapon in the hands of our skilful pilots. The armistice has prevented the machine from appearing in

quantities on the front. The enemy press had already learned of the appearance of this machine, and we find in the Matin, during August, an article dealing with it, and English technical journals conclude a description of the Siemens by challenging the English industry to overtake, by intensive work, the lead which the German industry has gained with this machine and motor.



Photograph of a Barograph record of the climb of a Siemens Single Seater. The first 2,000 metres were climbed in 3 minutes; 2,000 to 3,000 in 2.5 minutes; 4,000 to 5,000 in 2.5 minutes; 5,000 to 6,000 in 4.5 minutes; 6,000 to 7,000 in 7.5 minutes; 7,000 to 8,000 in 12 minutes and 8,000 to 8,100 in 12 minutes and 8,000 to 8,100 in 1.5 minutes. Total, 8,100 metres in 36 minutes

### Aeronautic Courses at College of City of

New York
New York, N. Y.—The College of the
City of New York announces six aeronautic courses, each covering eight weeks of six hours each, at a fee of \$12.50. Pro-fessor D. B. Steinman is in charge of the instruction.

The aeronautic laboratories of the college contain equipment valued at \$100,-000 including the leading types of aeroplanes and aviation motors

These courses are arranged to prepare men for the flying schools, for employment with the aircraft and motor companies, and for positions as draftsmen, designers and aeronautical engineers. The signers and aeronautical engineers.

registration since the start has been over

The courses offered are:

Aeroplane Mechanics — A practical course on the principles of construction and operation of aeroplanes and aeroplane engines, with laboratory practice in the assembly, adjustment and repair of planes and motors.

Advanced Aeroplane Mechanicstailed study of the leading types of aviation motors. Practical exercises in the operation and adjustment of engines and systematic training in locating and rem-

edying motor troubles.

Aeroplane Design—A course in the elements of Aerodynamics applied to the design of aeroplanes. The practical work includes complete design of the different types of aeroplanes for specified requirements.

Aeroplane Design—Drafting-room practice in making detail and assembly drawings for aeroplane production.

Aeroplane Motor Design—A course in the theory and practice of the design of

internal combustion engines with special

reference to aeronautic motors.

Mechanical Inspection—A course designed to prepare men for the positions as inspectors in aeroplane and motor production plants.

New classes in all courses start Oct.

2d, Dec. 1st, Feb. 2d, April 1st.

# THE THIRD PAN AMERICAN AERONAUTIC CONGRESS

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Desde el Sabado, Febrero 21 hasta el primero de Marzo ambos inclusives de 1920, en la Habana, Republica de Cuba.

PROGRAMA.

Concursos que se verificaran todos los Dias

1. Concurso de Hidroaeroplanos (eu general).
2. Trofeo y Premios de Curtiss por aviacion maritima.
3. Concurso de Aeroplanos Terrestres.
4. Concurso de Paracadas.

PROGRAMA DIANO

1. Exhibicion de aeroplanos, motoras y sus accesorias en el Salon de Exhibiciones.
2. Demostracion y Ensayos de Hidroaeroplanos, Aeroplanos, Terrestes, Motoras, Globos, Dirigibles y Globos Cautinos para compradores.
3. Vistas Cinemalografas y Discursos sobre las fases mas importantes de lo aeronautica.

Los Gobiernos de los Estados Unios, Argentina, Brasil, Bolivia, Chile, Columbia, Costa Rica, Republica Dominicana, Ecuador, Honduras, Haiti, Panama, Ginstemala, Paraguay, Peru, Portugal, El Salvador, Espana, Uruguay, Venizuela, Majioo, y Nicaragua, sai como los Societades Aeronauticas, Deporitivas, Sicarionadas, Company, C

# Troisiene Convention et Exposition Aeronautique Pan-Americaine

Sous les auspices de la Ligue Aerrienne de Cuba, l'Aero Club of America, The Aerial League of America, la Federacion Aeronautique Pan-Americaine et l'Association du Tourisme Aerien.

# Du Samedi 21 Fevrier, 1920 au Lundi l Mars, inclus. a HABANA, CUBA

Concours Devant Etre Tenus Chaque Jour. \$25,000 Prix.

- 1. Councours d'hydravions.
- 3. Councours d'Avions.

- 5. Councours de Parachutes.
- 2. Trophee et Prix Curtiss pour Aviation Navale.
- 4. Councours de Dirigeables.
- 6. Councours de rapidits d'ascension, de descente et de manoeuvre pour ballons captifs.

# **EPREUVES QUOTIDIENNES**

- 1. Exposition d'Avions, Moteurs et Accessoires.
- 2. Demonstration et assais d'hydravions et dirigeables, vallons captifs aux acheteurs eveneuels.
- 3. Transport de passagars par hydravions et dirigeables, et ascensions en ballons captifs.
- 4. Representations cinematographiques et conferences sur les phases les plus importantes de aeronautique.

Le Gouvernement Français, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants sont invites a se presenter a l'Etat Major Comite de la Convention a l'Hotel Plaza, Habana, Cuba pour se faire inscrire et recevoir leur insigne et la programme official.

Toutes comunications devront etre addressees a Monsieur Hannibal J de Mesa, Royal Bank of Canada Building, Habana, Cuba.

# Terza Convenzione ed Esposizione Aeronautica Pan-Americana Sotto gli Auspici della Liga Aerea Cubana, dell'Aero Club of America, dell'Aerial League of America, La Federazione Aeronautica Pan-Americana ed the Aerial Touring Association. Dal 21 Febbraio al Primo di Marzo ad HABANA, CUBA PROGRAMMA Gare Che Avranno Luogo Ogni Giorno 1. Gare Idroplani (generale). 2. Voli nautici apparecchio tipo Curtiss-Trofei e Premi. 3. Gare Aeroplani di terra. 4. Gare Dirigibili. 5. Gare Velocita asocsa e discesa, e manovre di Palloni frenati. 6. Gare Paracadute. AVVENIMENTI QUOTIDIANI 1. Esposizione di Aeroplani, Motori ed accessori. 2. Escroitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili Pallanifrennati. 3. Transporto Aereo passeggeri su Idroplani, e Dirigibili Ascensioni Palloni frenati. 4. Spettacolo cinematografico e discorsi sul elpiu importanti fasi dell' Aeronautica, dell'ordine seguente: Il Governo d'Italia e le organizzazione italiane di Aeronuatica di Sport e di Scienze d'Italia del Italiane all estero sono invitati a mandare rappresentanti ad assistere a questo grande evento aeronautico. Arrivando a Habana, Cuba, i Signori Rappresentantii dovranno presentarsi al Quartiere Generale del Comitato al Hotel Plaza, per registrasic ricevere la targhetta ufficiale, nonche il programma. Ogni comunicazione devra essere indirizzata al Signor Hannibal J. de Mesa, Royal Canadian Bank Building, Habana, Cuba.

# FREE BALLOONING

# By CAPTAIN LANCE RUSHBROOKE, R.A.F.

HE public at large is ant to regard the spherical balloons which they see drifting slowly across the skies relics of a stage already passed in the

evolution of aeronautics

Inevitably, the aeroplane, the seaplane and the airship, with their independent precision as means of aerial locomotion, have gone far toward eliminating the operational uses of free balloons. For such military purposes as reconnaissance, transmission of messages or supplies, or even photography, depending as they do absolutely upon favorable winds, free balloons, as a matter of fact, were never of first-rate practical value, though there are, of course, instances on record of their successful use.

During the American Civil War, for example, La Fontaine carried out a reconnaissance over hostile lines, and by the greatest good luck managed to get back to his own lines by rising to a much greater height and striking a contrary air current. During the siege of Paris bal-loons were used on several occasions to carry out messages, passengers and pig-(Jenson, the astronomer, escaped in this manner for the purpose of observing an eclipse from Tripoli, and, of course, the historic escape of Gambetta from the beleaguered French capital will be recalled.) Again, during the siege of Lady-smith, a moored spherical balloon was with considerable success for locating the Boer artillery; but this last and most valuable military operational use of the spherical balloon has now been usurped by the introduction of the improved kite-balloons—the now familiar sausages—which have the advantage of familiar being far more stable than the spherical type, and are capable of being flown in a

gale blowing at 40 miles per hour.

Yet the free balloon is far from being obsolete, nor is it likely to become so. It plays an important part in the training curriculum of the Royal Air Force, and every airship pilot and kite-balloon observer goes through a course at the R.A.F.

free ballooning school.

The primary object of this course is to teach the best methods of navigating-and a good deal more is possible in this respect than would be supposed by the layman-and of landing a lighter-than-air craft.

It is really a provision against emergencies: one of those typical safeguards that the R.A.F. wisely insists upon, both in training and actual work. The course is included in order to equip the pilots and observers with the necessary confidence and experience and handling their craft, in the event of their breaking away from their moorings, in the case of kiteballoons, or of engine failure in the case

of an airship.

If the wind be blowing towards the enemy's lines, the only course open to a K.B. observer whose balloon has broken loose is to take to his parachute. But, on the other hand, if the wind be blowing from the enemy's lines, the first duty of the observer is to salve his craft. as the learner soon discovers, considerable skill is called for in the navigation and proper landing on suitable ground of a

balloon.

An airship which has been disabled, the result of engine failure caused either by enemy fire or-rare occurrence-by irremediable mechanical breakdown,

comes in effect a free balloon. cessity of ballooning knowledge is the more apparent in such a case, because the larger part of the work of such craft is carried out oversea, where a parachute offers no solution. Here, again, the craft which has become in effect a free balloon must be navigated until the shore is reached, and a careful landing made, if e craft is not to be wrecked. The R.A.F. free balloons used for this

training purpose are of several sizes, carrying from one to eight passengers in the wicker basket suspended beneath.

Round the sides hang the bags of sand ballast. Anyone used to aeroplanes at first misses the numerous "gadgets" that surround one in the cockpit of a 'plane The basket appears strangely bare. three instruments are carried in a balloon: -The altimeter, which registers the height above sea level; the statascope, the bubble of which indicates whether the balloon is ascending or descending, and-the prime -a compass.

The course of instruction normally consists of six flights. The officer under in-struction makes his first four ascents entirely as a pupil. He watches the pilot in charge, keeps a careful log of each journey, and follows the course on the map. Practical map-reading, by the way, is another important subject which is taught by this course, and, travelling in a comparatively slow-moving balloon, the novice finds it much easier to pick up landmarks and follow his course than he would were he doing it for the first time in an aeroplane moving at from 70 to 100 m.p.h. or more.

On the fifth trip the pupil, though still under the superintendence of the pilot, handles the balloon himself. This is called his "pass-out" trip. Providing he has his "pass-out" trip. Providing he has thoroughly satisfied the instructors as to his capability, he is then allowed to do his "sloo." On this occasion he takes up the smallest size balloon, and manages the whole flight himself, navigating it, keeping the log, and landing it without assistance.

By navigation is implied the finding of the most suitable air currents—which vary at different altitudes—and keeping the balloon at that altitude, so securing the best

speed and direction possible.

There is a very real fascination about ballooning—due in part, it may be, to the uncertainty as to one's final destination, owing to possible changes in the windthat strongly appeals to the adventurous spirit of youth. Apart from its practical value, it is a unique form of sport, and it makes enthusiasts of all who are en-

the occasion of my last flight w ascended in a medium-sized balloon with four passengers—the instructors, a pupil on his second trip, another on his "passan air-mechanic and myself.

One is hardly conscious of motion, on the command, "Hands off," the l the little group of mechanics let go the lines, and the huge sphere of yellow fabric lifts the basket from the ground and soars upwards.

As soon as we are clear of the houses the trail rope is thrown out. This is exactly 300 ft. long, and in descent acts as a check upon the altimeter, for that instrument registers only our height above sea-level. Thus, your altimeter may show 600 ft. when the end of your trail rope, almost on the ground, proves your actual

height from that particular part of the earth to be little more than 300. it checks too sudden a when landing, descent by acting as ballast as more of the weight of the heavy rope is taken up by the ground, and, thirdly, it makes it easier to take the exact course by compass.

It is strangely still and peaceful up here, wonderful contrast with the roar and rush of an aeroplane. All the sounds of the countryside come floating up as we sail placidly overhead. The lowing of sail placidly overhead. The lowing of cattle, the song of birds, and the excited clucking of poultry as they scatter from the path of the path of our approach, many hundreds

of feet aobve them.

We are losing height a little, and the "pass-out," with his eye on the altimeter, throws over the contents of a bag of last. The sand falls slowly, and, tailing out in a yellow streak, is lost to view before it reaches the ground. The roar of a distant train marks our approach to a railway. Rivers, canals, roads, villages and towns float below us in a fascinating a railway. and multi-colored panorama. In a balloon one has leisure to appreciate such details. I noticed with particular interest the yellow and russet brown circles formed by

fallen leaves round every tree.

Then the rain came. As the weight of the water on the balloon increased we lost height rapidly. Bag after bag of ballast had to be emptied at irregular intervals. Again the sun shone, and as the envelope dried and the gas expanded we rose rap-The statascope bubble reversed. The altimeter needle climbed slowly from 500 ft., 1,000, 1,500, until it touched 4,500 our maximum altitude on that trip. Fleecy clouds beneath now gave us snow-white carpet. By this time passed through three counties-Hertfordshire, Bedfordshire and Northamptonshire

shire, Bedfordshire and Northamptonshire—and was entering Leicestershire.

The sun had expanded the gas and had driven a good deal of it through the bottle-neck just above our heads—left open to prevent any risk of burst—and once more we began to sink at the rate of perhaps 200 ft. a minute. Our ballast was nearly finished, so we began to cast about us for a suitable landing ground. We were now passing houses in long We were now passing houses in long straggling villages. Chimneys of black straggling villages. Chimneys smoke proclaims it a colliery district. The trail rope is just above the roofs. The smoke from the factory chimneys indicates that the ground wind has increased. It is gusty now and will make landing less easy.

The pilot takes charge.

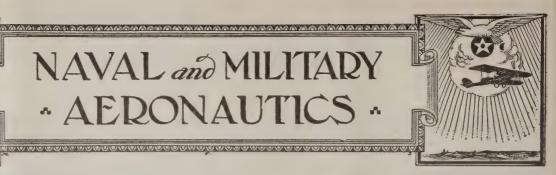
grapnel!" We pass the last house. He pulls the valve cord, and we lose height

Let go the grapnel!" The iron spike falls from the basket, and in a second or so we feel a jar as it bites the ground. The balloon pitches and then bounds forward again as the grapnel gives. The branches of a tree scrape the basket as we skim over it. Then once more the grapnel bites, and in that instant the pilot pulls the ripping cord, letting out the remaining gas through the letting out the remaining gas through the open panel. Rapidly we sink. The basket touches the ground. A gust of wind catches the envelope. A few convulsive bounds, and then the whole contrivance comes to rest.

An hour or so later we and our balloon are in the train, on the way back to London, after an instructive and interesting



# NAVAL and MILITARY AERONAUTICS



# Maynard the Winner of Army Air Service Race

Not only as a sporting event of inter-national interest, but as a valuable aid in demonstrating the capabilities, shortcomings and needs of the aeroplane in beings and needs of the aeropiane in becoming a factor in commerce, industry and transport, the Transcontinental Air Race, conducted by the Army Air Service, proved the premier event of its kind up to the present time.

On October 8, seventy-two flyers were

ready to start the transcontinental race. Sixteen of these left from San Francisco and fifty-six from Mineola. The entries included aeroplanes of the following makes: Martin bomber, De Haviland, Le Pere, SE-5 and Fokker, the De Havilands being in the majority.

The total distance of the route from Mineola to San Francisco is 2,700 miles.

Between these two points, stops were re quired at twenty controls, at the following points at which stops of at least thirty minutes and not more than forey-eight hours must be made. The control stops hours must be made. The control stops are Binghamton, Rochester and Buffalo, N. Y.; Cleveland and Bryan, O.; Chicago and Rock Island, Ill.; Des Moines, Iowa; Omaha, St Paul, North Platte and Sidney, Neb.; Cheyenne, Wolcott and Green River, Wyo.; Salt Lake City and Salduro, Utah; Battle Mountain and Reno, Nev., and Sacramento, Cal. The average distance between controls is 123 miles. The shortest jump is fifty-six miles between

tance between controls is 123 miles. The shortest jump is fifty-six miles, between Rochester and Buffalo; the longest 180 miles, between Buffalo and Cleveland.

The altitude of the land at the lowest control, San Francisco, is fifteen feet; at the highest, Wolcott, Wyo.; 6,623 feet. Time changes at Cleveland, North Platte and Salt Lake City.

Lieutenant Mannard, winner of the New

Lieutenant Maynard, winner of the New

York-Toronto-New York race, was the first to finish the 5,400-milé transcontinental race. According to an announcement from the Air Service made on October 21, his time was as follows: From New York to San Francisco, 25 hours 11 minutes 8½ seconds; from San Francisco to New York, 43 hours 52 minutes and 32

to New York, 43 hours 52 minutes and 32 seconds; total round trip, 69 hours 3 minutes 40½ seconds.

The next contestant to complete the circuit was Captain J. O. Donaldson, an ace, flying an SE-5. His time was as follows: New York to San Francisco, 31 hours 37 minutes 19 seconds; San Francisco to New York, 25 hours 56 minutes 38 seconds; total round trip, 57 hours 33 minutes 57 seconds.

Besides being the second to finish, Captain Donaldson had the distinction of being the only man to complete the race

ing the only man to complete the race

flying alone.

The third entry to complete the race was Lieutenant Alexander Pearson, Jr., who bettered the time of the two aviators who preceded him. Even when the 18 hours which Lieutenant Maynard spent in replacing his lost engine at Wahoo, Neb., is deducted from his time, it is lower than that of Maynard. The record is as Neb., is deducted from his time, it is lower than that of Maynard. The record is as follows: San Francisco to New York, 21 hours 51 minutes 24 seconds; New York to San Francisco, 26 hours 45 minutes 52 seconds; total round trip, 48 hours 37 minutes 16 seconds.

On October 22, Captain L. H. Smith in a De Haviland Bluebird completed the circuit, the first started from San Francisco to finish the race. His time is as follows: San Francisco to New York, 31 hours 37 minutes 19 seconds; New York to San Francisco, 26 hours 13 minutes 28 seconds; total, 57 hours 50 minutes 47 seconds 47 seconds.

The records given above are subject to revision, but no changes have been announced by the War Department, although the contest has been closed for some time. It was announced that the contestants covered a total of 124,777 The latter stages of the prodonged race were hampered by severe weather.

# General Pershing Favors Consolidated Air Service

Washington, D. C.—General John J. Pershing, at a joint meeting of the Senate and House Military Affairs Committee on November 5th, expressed his approval of Senator New's bill providing for a separate department of aviation. The creation of a military department of aviation, he said would not meet the city to be he said, would not meet the situation because the development of commercial aviation would not be properly encouraged.

"It seems to me in proposing a separate department of aviation we are anticipating a development which should be made under the War, Navy, Post Office, Interior and other departments of government. Our development under these agencies ought to proceed a while before we jump into the establishment of a separate de-

partment.

"I have not been able to see why the Secretary of War and the Secretary of the Navy and other government heads could not get together and work this thing out. I am inclined to think this should be done first of all."

Senator New then pointed out that a consolidated department is essential to encourage commercial as well as military aviation. General Pershing expressed his

complete approval of this point.

In his remarks, General Pershing expressed the opinion that the essential



An excellent view of the French Spad. It is equipped with a 300 H.P. Hispano-Suiza engine

branch of the service, the infantry, must utilize all the auxiliary services, and an adequate air force is absolutely essential in aiding the infantry to attain its objec-

# Course for Aerial Observers at Pennsylvania Military College

Philadelphia, Pa.-Twenty students are listed in the new course on aerial navi-gation, which has been inaugurated at gation, which has been inaugurated at Pennsylvania Military College. The course Pennsylvania Military Lieut. Theodore H. is being conducted by Lieut. Theodore H. Cowee, A.S.A. A Curtiss biplane is part of the school's curriculum.

# Enlistments in Air Service

Washington, D. C.—The voluntary enlistments in the Air Service since February 28, and including October 25, are 3,506 one-year enlistments and 5,866 threeyear enlistments. This total of 9,372 enlistments is 7.3 per cent of all the voluntary enlistments in the army during that period.

# British Government Thanks American Officers

Washington, D. C.—The official thanks of the British Government to several American officers for the assistance they American otheers for the assistance they rendered the development of aeronautics is expressed in a letter to Secretary Baker, according to an announcement made on November 5.

Those mentioned specifically were William C. Potter, Assistant Director of Aircraft Production; Brig.-Gen. Brice C.

Dique, former head of the Spruce Production Division; Colonels Edward A. Deeds and J. G. Vincent, assistants in the designing of the Liberty motor, and Captain Raymond E. Carlson and Lieutenant Harald H. Emmons Navy Air Service Harold H. Emmons, Navy Air Service.

# Colonel William L. Kenly Made Com-mander of Order of the Bath

Washington, D. C.—Colonel William L. Kenly, formerly Major-General and head of the Army Air Service, has been made a Commander of the Order of the Bath by the British Government for his work in building up the American Air Service. The award was made through Commodore

L. E. O. Charlton, the British Air Attaché. On July 15, Ambassador Jean J. Jusserand, of France, decorated him with the Legion of Honor.

# All-American Pathfinders Finish Trip

Washington, D. C.—The All-American Pathfinders, with Major Ora M. Ballinger as commander, have completed their cross country tour at Fort Snelling, Minn., on October 30. The tour was begun on August 6. Information on aerial routes and landing places was obtained along the way; municipalities encouraged to establish landing fields and expert advice establish landing neids and expert advice given in the establishment and improvement of landing places under consideration; land-marks recorded, and all this information is being embodied in a comprehensive report to the Air Service.

The following landing fields were rated

in accordance with the four Government specifications for landing fields:

Lebanon, Pa 3 Harrisburg, Pa 1 Huntington, Pa 3 Altoona, Pa 2 Johnstown, Pa 3 Pittsburgh, Pa 4 Coshocton, O 1	Newark, O.       2         Columbus, O.       3         Mansfield, O.       3         Minerva, O.       3         Richmond, Ind       1         Frankfort, Ind.       3         LaFayette, Ind.       3	Milwaukee, Wis 1 Madison, Wis 3 La Crosse, Wis 1 Eau Claire, Wis 1 Winona, Minn 1 St. Paul and Minneapolis, Minn 1

# Colonel Hartz in Rim Flight Makes Record Non-Stop Flight

Paso, Tex.-Establishing what is said to be a long distance non-stop record, Lieut.-Col. J. S. Hartz flew from San Diego, Cal., to El Paso, Tex., 857 miles, in six hours fifteen minutes. The average speed for the flight is 137 miles an hour. Col. Hartz is making a flight around the rim of the United States.

### Advisory Board Recommends Army Unified Air Service

Washington, D. C .- The report of the special army board appointed by the War Department to study the aircraft situation and make recommendations for legisla-tion was made to the Senate Military Committee on November 5 through Sec-retary of War Baker.

The board was composed of Major-

General Menoher, Director of Army Air Service; Major-General Coe, Chief of Coast Artillery; Major-General Haan, Chief of the Training Section, General Staff, and Major-General Snow, Chief of Field Artillery. It recommended that Congress enact

an aviation policy based either on a ten-year program with large annual appropriations guaranteed to stimulate commercial aeronautics, or make appropriations for aircraft development by the Post Office, War and Navy Departments.

In case the former policy is adopted, the establishment of a separate Depart-ment of Aeronautics is recommended; in ment of Aeronautics is recommended; in case the latter is decided upon, a commission of co-ordination is to be appointed headed by a Director of Aeronautics, reporting directly to the President.

The board held that the army and navy should retain the essential elements of their organizations and retain complete

control of military aircraft. The army air service is to be on an equal footing with the cavalry, infantry and artillery.

In transmitting the report, Secretary of War Baker expressed disapproval of many of its recommendations. The President, he stated, should not be burdened with the duty of directing aircraft development; that duty should be divided among the Cabinet Officers of the departments affected. Speaking of commercial aviation development in Europe, Secretary Baker stated that the reported "feverish activity" is merely a race for military aeronautic supremacy. activity" is merely a race for military aeronautic supremacy.

An annual budget of \$300,000,000 for ten years is suggested and the report adds

that a single Government agency should be responsible for the procurement of all aircraft and of all development work. It is emphatic in declaring against crea-tion of "any military air force independ-

ent of army or navy control.



The Spad-Herbemont, with 500 H. P. Hispano-Suiza engine. This is a single seater, with excellent maneuvrability and a speed of nearly 240 kilometers per hour



# FOREIGN NEWS



# Challenge Leon Morane Offered for French Altitude Record Holder

Paris.—In accordance with the wishes of the late Leon Morane, the pioneer French aviator, Robert Morane has turned over a 10,000 franc prize and a cup to be awarded to any French aviator who holds the French altitude record in a French single-seater plane for a period of one year.

# Four London-Paris Services

London.—With the inauguration of the Compagnie des Messageries Aeriennes London-Paris passenger service and that of the Farman Brothers, there are now four companies carrying passengers between the two cities. The Handley-Page Company and the Airco Service have been in operation for some time.

# 20,000 Commercial Aeroplanes in Germany

Paris.—According to the Paris newspapers, there are now 20,000 commercial aeroplanes operating in Germany. Considerable concern is felt in France over this tremendous growth of the aeronautic industry and in the supply of aircraft, their military potentiality being appreciated.

# René Fonck Campaigns by Air

Paris.—René Fonck, the Ace of Aces, who is said to have downed more than 150 enemy planes during the war, is a candidate for the French Chamber of Deputies from the Vosges District. An aeroplane is the most important part of his campaign equipment. He uses it in going from place to place and in dropping campaign literature along

# French Engineer Patents Baby Electric Plane

Paris.—A 130-pound aeroplane is France's latest contribution to aerial progress. A French engineer named Archer took out a patent for the baby machine, which is electrically propelled with a maximum speed of 155 miles an hour and capable of carrying two passengers. Archer expects the machine to revolutionize communication between cities. Archer is inventor of the French army's "baby cannon."

# Southampton-Havre Week-End Service Inaugurated

London.—The Supermarine Aviation Works, Ltd., of Southampton announce the inauguration of a regular week-end service between Southampton and Havre, a distance of about 125 miles.

### Blackburn Starts London to Leeds Air Line

London.—The Blackburn Aeroplane Company, Ltd., have inaugurated a regular service between London and Leeds. Eight passenger planes, capable of carrying 400 pounds of goods or mail in addition. The fare is 15 guineas single and £30 return trip.

A number of aircraft manufacturers have announced their readiness to carry passengers or goods for any distance. These include the Grahame-White Company, the British Nieuport Co., the General Aircraft Co., and the Alliance Aeroplane Co.

# Levavasseur and Gastambide Demonstrate Variable Surface Wing

Paris.—Mm. Gastambide and Levavasseur have obtained successful experimental results with a variable surface aeroplane of the latter's design. These pioneer engineers in 1908 designed and constructed the Antoinette monoplane, which is one of the most graceful aeroplanes ever built. The designers retired from aeronautics in 1912 and their return is viewed with great interest.



Felix R. Regan, the first aviator of Porto Rico and his Curtiss Biplane

# French Airman Loops the Loop 624 Times

Madrid.—Alfred Flamval, a French aviator, made 624 loops in two hours in a military aeroplane, according to a dispatch received from here dated October 27. A leak in the petrol tank forced him to descend.

# James Gordon Bennett Cup to be Contested for in U. S. Next Year

Paris.—The International Aeronautic Federation has decided that the competition for the James Gordon Bennett Cup for balloons will be held in the United States in 1920. Prince Roland Bonaparte has been elected President of the Federation for the next year.

# Cronstadt Under Aerial Bombardment for Three Months

Viborg, Finland.—British aeroplanes have been bombarding Cronstadt daily for three months, according to an Associated Press dispatch dated October 27. The British aircraft are basing at Bjorko and Terijoki.

# Lieut.-Col. J. C. Porte Dies

Lieut.-Col. J. C. Porte Dies

Brighton, England.—Lieut.-Col. John Cyril Porte, formerly wing commander of the Royal Naval Air Service and inventor of the type of flying boat known as "Felixstowe Fury", has died here of tuberculosis. Before the war he made plans for attempting to fly across the Atlantic Ocean and went to the United States for that purpose. A large flying boat, named "America", was built at Hammondsport, N. Y., in which it was expected that he would essay the trip overseas by way of the Azores. The "America" was given numerous tests, but the war began and the projected flight was postponed indefinitely. Later it was said the craft had been bought by the British Government.

Porte returned to England and joined the Naval Air Service. After the war he went to St. John's, N. F., intending to attempt the flight, but was called home by the British Admiralty before his plans were completed.

# Air Force Seeks Clues for Lost Records of Pre-War Squadrons

London.—Sir Walter Raleigh, official historian for the Royal Air Force, has issued a statement calling for any information as to the whereabouts of the records of the 2, 3, 4 and 5 Squadrons of the Royal Flying Corps. These squadrons supplied information to the first British Expeditionary Force in France which saved it from being completely surrounded. The last information of the records of these squadrons is that they were shipped to a depot at Blandford, but they have not been found there.

# Paris-Cairo-Paris Flight by Commandant Vuillemin

—Commandant Vuillemin, in a Breguet biplane, powered by a sepower Renault engine, made the Paris-Cairo-Paris flight in

Paris.—Commandant vuintemin, in a Dregute topanic, portest of 300 horsepower Renault engine, made the Paris-Cairo-Paris flight in the following stages:

Paris-Marseilles (Aug. 11th), 433 miles.

Marseilles-Naples (Aug. 12th), 435 miles in 6 hr. 30 min.

Naples-Salonica (Aug. 13th), 466 miles in 5 hr. 45 min.

Salonica-Constantinople (Aug. 14th), 310 miles in 4 hr.

Constantinople-Cairo (Aug. 16th), 807 miles (372 over the sea) in

Constantinople-Cairo (Aug. 16th), 807 miles (372 over the sea) in 8 hr. 30 min.

Cairo-Beyrout (Aug. 26th), 372 miles (310 over the desert) in 5 hr.

Beyrout-Constantinople (Aug. 28th), 621 miles in 8 hr.

Constantinople-Naples and Naples-Istries (Sept. 8th), 745 miles and 496 miles—1,241 miles in 15 hr.

Istries-Paris (Sept. 9th), 391 miles in 4 hr. 30 min.

Commandant Vuillemin received seventeen citations, is an officer of the Legion of Honor, Companion of the Distinguished Service Order, has the Croix de Guerre with thirteen palms and five stars and the Order of St. Anne.

# \$50,000 Prize for Trans-Pacific Flight by Canadian Airship

Victoria.—In order to commemorate the visit of the Prince of Wales, Mr. Norman Yarrow, of Victoria, head of Yarrow, Ltd., has offered a prize of \$50,000 for the first non-stop flight across the Pacific Ocean from Vancouver Island to Japan. The flight must be made in a Canadian built machine before December .31, 1921.

# Regulations for Aircraft Radio Communication Issued by Air Ministry

Regulations for Aircraft Radio Communication Issued by Air Ministry
London—The Air Ministry makes the following announcement:—
The form of license to be granted for the use of Wireless to and from aircraft, and the conditions under which such licences will be granted, are under consideration. In the meantime, pending the issue of the licence by the Post Master General, temporary provisional authority for the installation and use of Wireless apparatus in aircraft can be obtained, in approved cases, by application to the Secretary of the Post Office.

For the present the wave length suggested for Wireless Telephony is 480 metres. This is the wave length which the existing Air Ministry W/T Stations at present employ for work with aircraft.

For the benefit of designers and others interested it may be said that the Post Master General's licence, when available, will probably contain provisions to the following effect:—
The sending apparatus installed at any aircraft station shall be constructed so as to be capable of using waves of 600 metres interrupted continuous wave, and 900 metres continuous wave; such of the following wave lengths, namely, 220, 300, 450 and 800 metres interrupted continuous wave, and 200-550 metres, 650-950 metres, 200-3000 metres continuous wave may also be used for transmission as are authorized in writing by the Post Master General.

The use of the wave of 600 metres (hereinafter referred to as the "aircraft-ship" wave) shall be confined to the use of the system known as "Interrupted Undamped Wave or Tonic Train," or I.C.W., and the use of 900 metres hereinafter referred to as the "Aircraft Normal Wave," shall be used only for continuous damped waves or Wireless Telephony.

Should an aircraft station be also fitted with a supplementary installation on long continuous waves, such installation shall be so constructed as to be capable of using the wave length of 2.400 metres.

Telephony.

Should an aircraft station be also fitted with a supplementary installation on long continuous waves, such installation shall be so constructed as to be capable of using the wave length of 2,400 metres.

The range of wave lengths for which the receiving apparatus may be constructed is not limited, but the apparatus must be capable of receiving on 600 metres and 900 metres, and on 2,400 metres when a transmitter working on this latter wave length is installed; it must also be made to embrace any other wave length on which a transmitter installed has been authorized to work.



# ELEMENTARY AERONAUTICS

MODEL NOTES

By John F. McMahon



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Sedgwick & Division Streets, Chicago, Ill.

# "Model Aeroplane Accessories,"

ANY interesting and instructive models can be constructed from the fittings and parts shown in the last issues of AERIAL AGE, not only the well-known flying and scale models, but the wind tunnel model

as well.

A wind tunnel model is a wonderful piece of work, as it must be exact to the smallest part of an inch in order to check up results of tests. The model is a faithful copy of some larger machine which is to be built, and is placed in the wind tunnel through which a breeze of 30 M.P.H. is blown against the model, which is attached to an arm that extends outside and is in contact with a sensitive machine that registers the lift as well as the resistance on the model.

The model being a certain proportion of the big machine shows the proportion of lift and resistance of the larger one. Multiplying by a certain factor gives the required results.

That this method is nearly exact is proven by the fact that Curtiss and other firms, as well as numerous colleges, are using wind tunnels today for this purpose. Every machine proposed to be built at the Curtiss plant is preceded by a wind tunnel model and tested for its capabilities. When the wind tunnel model and tested for its capabilities. When the test is over changes can be made and tried again. This method saves both thousands of dollars and time, because it would be necessary to build a large machine and make changes later,

if the wind tunnel was not available.

Wind tunnel model makers get large salaries and their work is really interesting as the types to be tested vary and something new and startling is coming through all the time.

Model builders should be faithful in their studies of aerodynamics, not with simple model flight alone. This is an easy

matter with all the good books which are available on the

matter with all the good books which are available on the subject at the present time and the engineering courses which are being taught at the different schools and colleges.

A close study of the larger machines will help you in your model work and every model flier should follow up the new designs in aircraft and study the details very carefully. This will prove helpful in designing models whether of racing or scale type.

# Illinois Model Aero Club to Hold Contest Scale Model Contest-December 5th

A shield, offered by Mr. Walter L. Brock, is to be awarded for the scale model that makes the best showing in the contest of December 5.

# Armour Selley's Models

An excellent example of the opportunities afforded model builders is that of the old model flyer, Armour Selley. He will be remembered as a former record holder and champion for the year 1913, when he made an official record of 2,800 feet. Selley's models were easily distinguished by the careful

workmanship, the large wings and the extra large propellers. Mr. Selley has grown considerably since 1913, but his interest in the model has not diminished, for though he has been connected with various prominent aeroplane companies during the war, he is now back in the model game, designing racing types for the Flying Model Aeroplane Corporation. The reader will at once recognize Selley's work in these models and they are known by the following marks:

Figure 1 is known as F4
" 2 " " " F3
" 3 " " " F5
" 4 " " " F1 66

Those known as F1, 2 and 3 are the most popular and can be found in almost every large city throughout North and South America.

Mr. Selley's success should be an inspiration to model builders who aim to be proficient and successful in this most in-

# Something About Dope

A good dope can be made at home when a better one is not available by using the following formula:

Dissolve one pound of powdered alum in a gallon of boiling water; stir well. When dissolved, add 5 lbs. of ground glue and allow to dissolve until the mixture has the appearance of ordinary paint. Then add about 2 tablespoonfuls of glycerine. This mixture should be kept warm while using, and applied with an ordinary brush. This will shrink the fabric and fill the

pores. Two coats must be applied and then a coat of Spar varnish. Care must be taken when applying any form of dope to prevent the mixture from penetrating and the coating the other side of the fabric, for then there is danger of cracking.

Some people prefer the above for a sizing coat as it is inexpensive, and a large quantity of dope is required on fabric. Again, most dopes pull the cloth too tightly, but if this is used the shrinking will be gradual.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

# The Flying Man

(With apologies to R. L. S.: "The Vagabond")
Give to me the 'bus I love, Let the wind sing by me;
Gie the jolly heaven above
And the Vickers 'neath me.
Climb and loop in a neat S.E.,
A spiral dive that's clever;
There's the life for a man like me,
There's the life for ever.

Let the blow fall soon or late, Let what will be o'er me; Give the face of earth around And the prop before me. Wealth I've none, save hope and love, And a friend to know me; But I have the heaven above And the world below me.

Let misfortune fall on me
Where aloft I linger,
Silencing the droning Vee . . .
Down, with luck, I'll bring her. In some pond, or tree, or field
I will find a haven; Or, perchance, the Fates will yield A pukka landing even.

Let the blow. &c.

N. HARLEY, in Flying.

# Rough Things

Wife: "John, there's a burglar in the house! Go right downstairs."

Hubby: "My dear, I'm not in the habit of associating with that class of people. Send a servant."—Voodoo.

# Not Risking Information

The fact that ammunition was drawn generally at night, says an extract from an A. E. F. ordnance officer's report, with lights of all kinds prohibited, was further complicated by the regulation that in that zone no information was to be given out concerning the identity of units, the direction troops were taking, or the mission on which Army units were engaged. A too literal interpretation of these rules led at one time to the following dialog: A dump commander, on a very dark night, had issues to make to several different organizations. One train was being loaded when another animaltions. One train was being loaded when another animal-drawn train was heard approaching. The dump commander, drawn train was heard approaching. The dump commander, to lose no time, went out into the road and asked who was in charge. A voice replied: "I be."

The dump commander asked: "Are you after ammunition?" To which the owner of the voice, mindful of the instructions, replied: "None."

"What are you here for, then?"

"Oh, just taking the mules out for an airing."

"What organization are you anyway?"

"What organization are you, anyway

"This is the horse section of the Air Service." "See here, who are you?"

"I be the mess sergeant, who be you?"—Army and Navy Journal.

# Out o' Luck

The unlucky Tommy in Russia was telling his troubles to a sympathetic friend.

"No leave, no letters, no blinking Blighty, no luck at all!"
"Never mind; you'll soon be dead."
"Yes," said the unlucky one, "and if I was dead now, and on my way to Heaven, I'll bet I'd be brought down by anti-aircraft!"—American Legion Weekly.



Briggs in the New York Tribune

# Maybe She Wanted Him to Be a Kiwi

"Don't barrel-roll, I beg of you," Her parting words had been. So Sonny always nosed her down And let the old ship spin.

"Those awful side-slips, dear, I fear Will be the death of you."
So Sonny comforted his ma
And only did a few.

She worried him to death almost With warnings day and night . Against reverses, loop-the-loops And spirals that were tight.

"Fly low and slow, my darling son," His anxious parent said, If Sonny followed her advice He'd soon be with the dead.

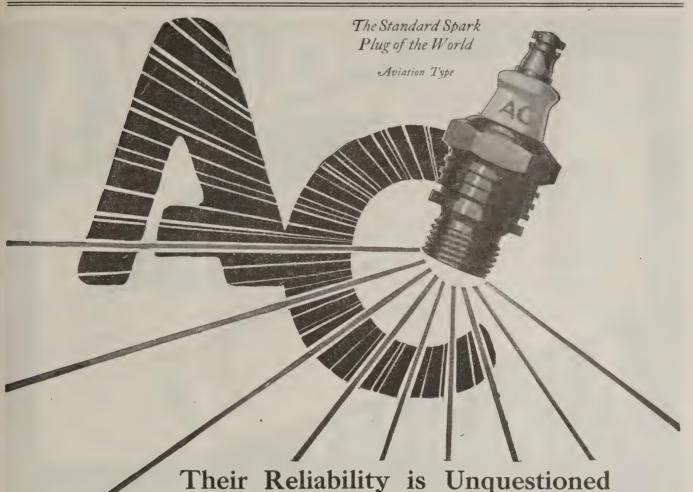
"Be careful, darling boy of mine, And do not go so fast."

If Sonny's motor slowed and died,
His days would soon be past.

"Don't jaz too long up in the air,
You're gone sometimes for hours."
But Sonny one sweet day bumped off.
Now please omit the flowers.

-Kay-det.





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Unfailing reliability and perfect co-ordination are essential to safe and successful flights.

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# Quality Tells in the long Pioneering Flights

Martin Bomber No. 2 was delivered to the U. S. Air Service in December, 1918, at Bolling Field, Washington, D. C. It was used for everything from training pilots, and taking senators on sight-seeing trips over Washington, to long distance flights, reaching as far as Macon, Ga., a distance of 630 miles. Ten weeks ago, with a record of 10,400 miles of cross country flying already to its credit, during which only repairs

Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts, John Harding, Jr., and Jeremiah Tobias.

of a minor nature were made, it was sent away under command of Col. R. S. Hartz on an 8000 mile pathfinding trip around the Rim of the United States. The journey has now been completed. The record—details of which will be published later—proves that Martin Quality tells in the Long Pioneering Flight.

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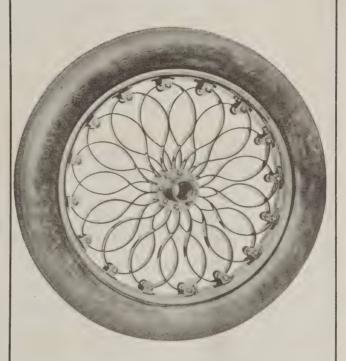
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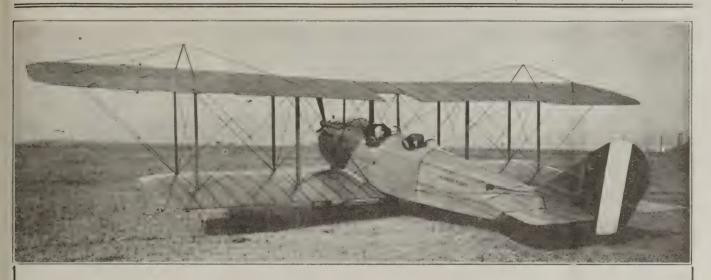
A big national advertiser will put one of the biggest advertising coups over when the first commercial liner jumps from New York to San Francisco, if he negotiates an arrangement to have a thousand aerial messages dropped over every important city enroute. We have scores of suggestions as to how this should be done, and we are closely in touch with the projected plans for Trans-Continental air trips, and the possibilities of utilizing them for aerial advertising.

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(Continued from page 246)

attendant upon these systems both in the air and on the ground is not warranted even on the basis that a large amount of territory is covered because these errors preclude precision mapping in a large part of their oblique portions, and, in order to keep this error at a minimum necessitates flying between 3,000 to 5,000 feet, which is dangerous, especially in country where landing fields are few and far between, for should for any reason the motor cut out or other accident incapacitate the airship, barring perhaps lighter-than-air craft, the pilot has not enough ceiling to seek a landing place quickly with the slight altitude he has left upon which to depend for momentum and its attendant gliding distance, which, more than likely might result in a fatal crash. It is therefore much simpler, safer and less expensive in the end to use a single short focal length lens and large plate or film and to fly at reasonably high altitudes for, as far as the actually usable part of the exposures for precision mapping is concerned relative to the amount of territory covered per exposure, it is proportionately greater in this case, while the work required on the ground is very much less. Naturally the objection is raised to high photographic flying that the majority of the time the cloud level will be so low as to seriously hamper operations and that the adoption of the low flying with a wide angle of view camera will give a greater operating period. There is some logic in this, yet it is not an overwhelming advantage for the reason that days suitable for aerial photography of any sort are few and when they do occur one can usually operate from high altitudes, and such a means of getting mapping data as this is so rapid that one can afford to wait for such days because they are sufficiently frequent to keep the work far ahead of any office force that would be maintained and relatively far more area could be covered in a year's time than was ever covered before by the older methods. Furthermore photographically the penetration

The above mentioned lack of verticality of the optical axis

of the camera, due to the motion of the plane in the air, can be overcome by the use of a gyroscopic stabilizer. Such a device as this the Air Service has had under contemplation and development for over a year and some recent experiments with an entirely new and unique device of this sort seems to indicate a very happy and practical solution of this problem. The tilt error decreases proportionately to the flying altitude, which, even with the stabilizing devices, is another argument for high flying in order to produce precise maps. With a ten inch lens at 10,000 feet with a tilt as great as 1°, there will be only an error of ten feet in the location of some objects at a scale of approximately five inches to the mile, and it is expected that the average tilt error will be considerably less than that with the new gyro stabilizer. To effectively control a camera to the vertical in the limited space of an aeroplane requires that the camera be simple in design and uniform in construction. Awkwardness will tend to create inertia, besides either making it hard to grasp the camera at the center of gravity, which is the proven point of support, or tend to allow the center of gravity to shift beyond reasonable counteraction. The solution of this problem of keeping the optical axis of the camera vertical or within a small known degree of variation from the vetrical will remedy one of the most pressing and serious demands of all aerial surveying systems, and will go a long way toward establishing aerial surveying as an independent means of producing maps.

as an independent means of producing maps.

Another source of error, but of a less serious nature than those already spoken of, is the great lack of accuracy in the existing types of altimeters or aneroids. These are so insensitive and inaccurate that it is impossible with a given reading to compute the scale of a photograph correctly without reference to some graphic means of measurement. We have, however, several excellent types of rectifying apparatus completed and tried which would always be able to take care of these variations in scale due to inaccurate altimeters. Research and care in construction will, however, produce an altimeter of much greater sensitivity and accuracy than now pertains and as soon as this is accomplished we will have superior raw results from the air to start computation on than we now have.

(To be continued)

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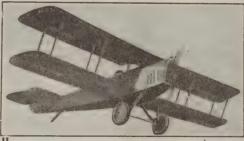
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ol. 10, No. 8

NOVEMBER 24—DECEMBER

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Wide World Photo

Crossing the Alps in An Aeroplane

Contests To Be Held At Havana, Cuba, During Third Pan-American Aeronautic Congress For \$25,000 In Prizes



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demonstrating the great commercial possibilities of the airplane. prominent Americans.

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We had had some considerable trouble with our spark them

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up to the time we reached New York, at inform you rouble whatsoever

to the B. G. Plugs, finished the trip without any

to the B as made we finished the trip without solicitation.

We are sending you this letter without solicitation. with our spark piugs, to please you and for that read the this information ought to please you and for that read this information without solicitation.

We are sending you this letter wishes, we are with very best wishes, truly, president yours very truly,



# **B-G PLUGS**

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PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W. Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., November 24—December 1, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, NOVEMBER 24—DECEMBER 1, 1919

NO 8

# CONTESTS TO BE HELD AT HAVANA, CUBA, **DURING THIRD PAN AMERICAN AERONAUTIC CONGRESS FOR \$25,000 IN PRIZES**

M. EUSEBIO S. AZPIAZU, Secretary to President Menocal of Cuba, and chairman of the Contest Committee of the Third Pan-American Aeronautic Congress, to be held at Havana, Cuba, February 21 to March 1st, inclusive, has announced the following schedule of contests to be held during the Congress for the \$25,000 in prices already offered: prizes already offered:

International Aerial Rally, prizes to be awarded to aviators making best non-stop flights from any point in the United States or elsewhere, to Havana, Cuba, between the dates of February 15 and 21, inclusive. First prize, \$2,500; second prize, \$1,500; third prize, \$1,000; fourth prize, \$500.

Cuban Independence Day Race, February 24, to take place February 24 from Havana to Cienfregos (approximately miles) and return. First prize, \$2,500; second prize, \$1,500; third prize, \$1,000.

third prize, \$1,000.

International Seaplane Race, open to flying boats and hydroaeroplanes, the course to be from Havana to Key West (approximately 65 miles), and return. First prize, \$2,000; second prize, \$1,000; third prize, \$500.

Morro Castle-Oriental Park Daily Aeroplane Speed and Skill Race, the best records made each day in a race of two laps (about 30 miles), starting from Oriental Park Race Track, flying to and circling Morro Castle and finishing at Oriental Park. Daily Prizes: First prize, \$500; second prize, \$250; third prize, \$100; fourth prize, \$50.

General Efficiency Contest for the largest number of points made in all-round performance contests, including: Pirst prize, \$1,000; second prize, \$750; third prize, \$500; fourth prize, \$250.

fourth prize, \$250.

Aerial League of American has offered a Pan-American Aviation Trophy, the rules for which are being drawn, and other important prizes will be announced shortly.

A number of American aviators will go to Cuba to participate in these contests, including the team of expert ex-U. S. Army aviators headed by Major Thorne Deuel, who have organized under the name of the American-French Aero Exposition for the purpose of giving demonstrations of advanced aviation through the country.

From Carlstrom Field, Florida, one team was sent last April to assist in arousing interest in the Fifth Liberty Loan. The success of the team was phenomenal and the enthusiasm with which its exhibitions were received decided its members to make this amusement their future business. The team from Carlstrom Field was under the command of Major Thorne Deuel, West Point graduate, who had had considerable experience along these lines in promoting Red Cross and athletic fun exhibitions at various Air Service Schools where he was in command.

Major Deuel is at present manager and has picked his additional personnel from the many thousand aviators, both in this country and abroad demobilized from the Armies of the United States and its Allies.

The Inter-Allied Aircraft Corporation is also planning to send a team to Cuba, besides the exhibit of British Auros and Sopwith planes. Colonel A. W. Bishop, British Ace of Aces, is president of the corporation; Lieut. Col. W. G. Barker and Major Reed G. Landis, vice-presidents; Charles H. Payne, manager; Stuart Macdoanld, assistant manager; J. W. M. Richardson, treasurer.

# MICHELIN OFFERS \$100,000 PRIZE FOR DIRECT **ASCENSION MACHINE**

THE Aero Club of America announces the offer of a prize of One Hundred Thousand Dollars (\$100,000), to be awarded to the person who evolves and demonstrates the first aircraft which will rise from and land on the ground

the first aircraft which will rise from and land on the ground vertically and will, in other words, make it possible to rise from and land on the roof of a medium sized house.

The prize has been offered by the French millionaire and veteran supporter of aviation, Monsieur Michelin, through the Aero Club of France, which is affiliated with the Aero Club of America.

Club of America.

The prize is offered to the designer or aviator of the first possess the greatest possible range of speed up to 124 miles an hour; (3) to land vertically within a radius of five meters. Colonel Jefferson de Mont Thompson, the president of the Aero Club, when interviewed at the Club House, 297 Madison Avenue, said:

Avenue, said:

"This contest is of special interest to the Aero Club

of America from many standpoints.
"A number of the members of the Club, including Mr.
Peter Cooper Hewitt, have been experimenting in this

line with very promising results.

"The development of aircraft capable of rising from and descending on the ground vertically will be a valuable and far-reaching contribution to aeronautics, as it will make it possible to land these aircraft almost anywhere

make it possible to land these aircraft almost anywhere instead of requiring large aviation fields as are required by present day aeroplanes."

Mr. Henry Woodhouse, vice-president of the Aerial League of America, who urged the development of aircraft capable of rising vertically three years ago in his "Textbook of Naval Aeronautics," as a means of solving the difficulty of landing naval aeroplanes on board of ships, said:

"The time is ripe for the advent of an aircraft capable

of rising and descending vertically and there is no doubt that Mr. Michelin's progressive offer will do much toward

realizing such a craft.

"Experiments with helicopter and other types of aircraft capable of rising vertically have been conducted in different parts of the world for the past fifteen years. The greatest obstacle has been the lack of light and re-

liable engines for these experiments.

"Suitable engines are, however, now available and there is considerable data available, the results of experiments conducted by prominent engineers in the United States

and Europe.

'Dr. Peter Cooper Hewitt and Francis Bacon Crocker, of New York, have been experimenting with helicopter for a number of years and have obtained remarkable re-

"Helicopter was tested at Hammondsport at the time Mr. Glenn H. Curtiss was testing his first aeroplane, eleven years ago, and the patent files show that scores of patents have been issued for various types of craft of the helicopter class.

"The possible winners of this prize are divided in two

"(1) Those who aim to lift the aircraft with vertical propellers;

"(2) Those who aim to lift the craft with rotating wings.

"Just which class will win remains to be seen. Mr. Michelin's offer will add impetus to the experiments and will no doubt result in bringing forth a practical craft that will rise vertically from anybody's roof or back yard or the deck of a ship and be capable of landing within

or the deck of a ship and be capable of landing within the same space.

"So far the only landings made on house roofs have been made with slow running aeroplanes, but they were essentially dangerous stunts.

"Mr. Michelin's many prizes for aviation achievements have all been won. The prize he offered in 1906 for the first landing made on top of the mountain Puy de Dome was considered absolutely impossible—but it was done three years after the offer was made. Likewise the Michelin trophy and prize which he offered for duration flights, which were considered impossible when he offered flights, which were considered impossible when he offered the prizes, were won as early as 1908 by Wilbur Wright and thereafter were won annually by aviators who always doubled the record made the previous year. Finally, when an aviator flew 14 hours without stopping in 1914, and, as it was difficult to expect that an aviator would fly 28 hours without stopping, the rules were changed to award the prize thereafter for cross-country flying."

# SECRETARY BAKER DISCUSSES INDEPENDENT AIR SERVICE IN ANNUAL REPORT

CECRETARY of War Newton D. Baker, in the course of his Annual Report, discusses an independent air service as follows:

# An Independent Air Service

The aeroplane was developed during this war from small beginnings into an instrument of the highest importance. When the war broke out, only a few years had intervened from the first successful attempts to fly heavier-than-air machines. The European belligerents immediately devoted their best talents to the development and production of aircraft, best talents to the development and production of aircraft, and throughout the war the progress was rapid and continuous, so that each year the best machines of the previous year were out-built, and extraordinary progress was made in speed, certainty of action, stability, and carrying power. This carried the war into the third dimension and raised new questions as to the relation of aircraft to the prewar military and naval establishments. Air raids upon great unfortified cities like London and Paris brought into the war a new element and constituted an abandonment of the time-honored practice among civilized peoples of restricting homhonored practice among civilized peoples of restricting bom-bardment to fortified places or to places from which the civil population had an opportunity to be removed. The practice was a part of the ruthlessness with which the Cen-tral Empires sought to terrify England and France into submission.

The actual loss of life caused by these bombardments was relatively small and the destruction of property, while large, had no appreciable effect upon the war-making power of had no appreciable effect upon the war-making power of either nation. Indeed, it may rather be said that the willingness of the enemy casually to slaughter women and children, and to destroy property of no military value or use, demonstrated to England and France the necessity of beating so brutal a foe, and it is most likely that history will record these manifestations of inhumanity as the most powerful aids to recruitment in the nations against which they were made.

There naturally grew up a system of antiaircraft defense, consisting of specially devised and adapted guns strategically posted on land, observation stations and systems for transmitting the alarm at the approach of hostile aircraft, and specially devised fighting airplanes for attack, to either drive off or destroy bomb-carrying enemy planes. They led also to a determination to retaliate by similar raids back of the enemy lines. Upon the wisdom of this course there was a such discourse the recognition of the second of this course there was much discussion, the more humane elements of opinion resisted being drawn into such a course, while an angered section of public opinion felt that the enemy was one having no philosophy but success, and no restraint of fear of the consequences. The geographical situation of England made it peculiarly subject to attacks of this sort, and there, therefore, grew up in England a sentiment in favor of an independent force which, disassociated from the other military

operations of the Allies, could carry out independent bombing operations on such a scale as should be necessary to protect English women and children by making the Germans fear to continue a mode of warfare which no humane instincts seemed able to restrain. For a variety of reasons into which it is not here important to go, but which have in part to do with the heavy tasks already laid upon the traditional military establishments and in part with the novel and rapid development of aircraft, the Air Service was given an independent status, although, of course, such Air Service as was necessary to act in immediate cooperation with either military or naval forces was placed under the respective command of the Army and the Navy.

When the armistice came, all the nations which had been engaged in the war faced a reorganization of offensive and defensive military agencies, and the question at once arose as to how far air fighting and the production and development of aeroplanes constituted so separate a problem as to justify separation from the Army and Navy, both in peace time and in war. This discussion has gone on in our own country, and bills have been introduced in Congress which aim to create an independent Air Service, some of them going so far as to create a new department of the Government, with a member of the Cabinet as its head. Proposlas on this subof design and production, and apparently much of the difference of opinion on the subject is due to the varying optimism and enthusiasm as to the possibility of future development of the aeroplane with which the subject is approached

In its very nature, the navigation of the air is a subject to fascinate the imagination. We are all becoming accustomed to these great mechanical eagles outflying the birds, vaulting through space and performing dazzling and terrifying aeronautical feats in defiance of all the limitations upon human movement to which we have been used; but each day seems to bring forth from the imagination of those who are making these contributions to our knowledge promises of even greater exploits. Sober men now speak of devices which will enable heavier-than-air machines to be sent 50,000 feet above the surface of the earth and there attain speeds which we the surface of the earth and there attain speeds which de-stroy the old relations of distance. The art itself is so new and so fascinating, and the men in it have so taken on the character of supermen, that it is difficult to reason coldly, and perhaps dangerous to attempt any limitation upon the future based even upon the most favorable view of present attainments. Nevertheless, there are some considerations which, when stated, enable us at least to see clearly the present problem.

(To be continued)



# THE NEWS OF THE WEEK



# Sperry Land and Sea Triplane in Successful Tests

Mineola, L. I.—The first official land test of a new hydro-aeroplane of the triplane type was made at Mitchel Field recently by representatives of the Naval Trial Board. The plane was produced by the Sperry Aircraft Company and is the first water and land plane to be successfully operated.

The new machine was designed for bombing purposes to be used from the deck of a battleship. It has a wing span of 48 feet, a 5 foot width and has a gap of 5 feet between the wings. It weighs 3,700 pounds, and today carried a total

load of 6,700 pounds.

One of the features of the new plane is that the bombs can be released by levers operated by the pilots in the cockpit. Another feature is that the plane has folding wheels, also operated by levers. These wheels can be dropped when a landing is made on land and folded when the machine drops into the water. The body is boat shaped.

The plane today reached an altitude of 400 feet and then flew at the rate of ninety-three miles an hour with three passengers. It was piloted by Lawrence B. Sperry. It is expected the new plane will have its water test at Rockaway Point in the near future.

# Maynard Travels by Air

Mitchel Field, L. I.—Lieut. Belvin N. Maynard, winner of the transcontinental aerial derby, returned here on November 9, having completed a week-end air trip to his home town of Clinton, N. C. He was accompanied by Sergeant Kline and his mascot dog, Trixie. After flying at the County Fair at his home town he left at 8 A. M. Sunday for Franklin, Va., where he preached at the morning service of the First Baptist Church.

of the First Baptist Church. Leaving Franklin at 2:30, the "flying parson" journey to Washington, where he was introduced to the House of Representatives by Representative S. M. Brinson, of North Carolina, and was the guest of honor at a luncheon by the Congressional delegation from that state.

# Caproni Flies Under East River Bridges

New York, N. Y.—A daring feat was performed by Lieut. Philips Melville, piloting a Caproni biplane recently, when he guided his huge craft under the East River bridges. A motion picture operator recorded the flight which included views of the water-front, the Statue of Liberty and the bridges. The Caproni was preceded by a Curtiss H plane piloted by Lieut. A. M. Roberts.

# LaGuardia Introduces Bill for Purchase of Planes

Washington, D. C.—Representative La Guardia, of New York, introduced on November 6 a bill to appropriate \$15,000,000 for the purchasing of 1,090 army aeroplanes. The proposed purchase includes 200 bombing planes, 50 observation planes, 100 pursuit planes, 140 training planes and 600 Hispano Suiza engines of 300 horsepower each. The bill provides that all purchases made under its provisions shall be of products manufactured in the United States. Representative La Guardia expressed the opinion that the House would object to any lump sum appropriations for aviation but that his bill, providing specifically the type of planes to be purchased, may receive the favorable attention of the House.

# Aerial Picnic at Lowell

Lowell, Mass.—Wesley L. Keough, an ex-army aviator, conducted the first aerial picnic on record on November 9 for the employees of Harry Pitts, the local Ford agent. Each employee was taken for a flight in Mr. Keough's Curtiss biplane and altogether forty flights were made during the day.

Pilot Wesley Keough served more than twenty months as a flying instructor at Kelly and Gerstner Field. His Curtiss plane was purchased in Toronto and flown from there to Lowell in 6 hours and 50 minutes

# Lieut. Brown and Commander Reed Guests of Aero Club of Pennsylvania

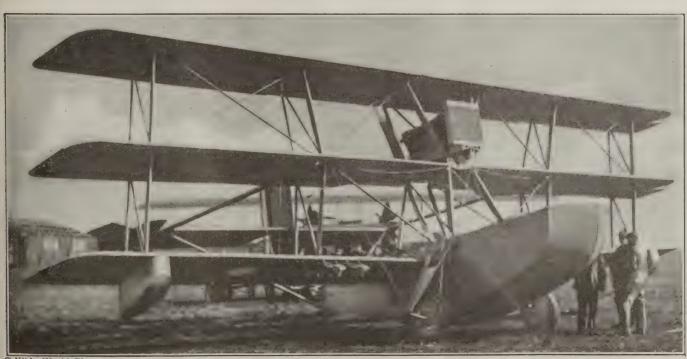
Guests of Aero Club of Pennsylvania— Philadelphia, Pa.—The Aero Club of Pennsylvania recently entertained Lieut. Sir Arthur Whitten Brown and Lady Brown and Lieut. Commander A. C. Reed, his officers and associates.

# Aeroplane Saves Insurance Adjuster's Time

San Francisco, Cal.—B. G. Mills, superintendent of the automobile department of the Fireman's Fund Insurance Company, was called by telegraph to make an adjustment on a burned automobile at Red Bluffs, 215 miles from San Francisco. Arrangements were made with Earle P. Cooper, the local Curtiss distributor, and the flight to the burned car begun at 10:41 A. M. At 2 P. M. the plane landed within a hundred yards of the car. The adjustment being completed, the return journey was begun at 3:30 P. M. and San Francisco reached at 4:30 P. M. This made Mr. Mills' return to his desk within five hours of the receipt of the telegram and constituted a saving of several hours.

# Scale Model of Lakehurst Dirigible Shed for National Museum

Washington, D. C.—A scale model one-sixteenth inch per foot to be erected by the Navy Department at Lakehurst, N. J., will be exhibited at the National Museum here. The hangar will be 800 feet long, 265 feet wide and 174 feet high, with accommodation for one ten million cubic foot airship with smaller ships on either side, or two five million cubic foot balloon on either side.



Wide World Photos

The Sperry Seaplane which permits landing on water and land, designed by Lawrence B. Sperry for the U. S. Navy

### of Transcontinental Official Winners Race Announced

New York City, N. Y.—The official figures and winners of the transcontinental aerial derby were announced here recently, their compilation having recently been completed by the Air Service. The elapsed time, the flying time and the order of finish in the handicap race is as fol-

### ROUND TRIP-ELAPSED TIME.

	ROOM INTEREST			
N			. M.	
1.	*Lieut, Belvin W. Maynard, DH-4. 9	4	26	05
2.	*Capt. I. C. Donaldson, SE-510	0	15	08
3.	†Capt. L. H. Smith. D. H. Bluebird11	0	51	53
4.	*Lieut. Alex Pearson. DH-412	0	44	30
5.	*Lieut. I. Hanzelman, DH-412	4	13	50
6.	*LieutCol. H. E. Hartney, Fokker20	6	42.	
7.	*LieutCol. J. O. Reynolds and			
	Lieut. Ralph Bagby, DH-420	3	33	
8	†Lieut. L. S. Worthington, SE-5.20	7	14	

\* Started from Mineola. † Started from San Francisco

	ROUND TRIP-FLYING TIME.		
	H. M	VI.	S.
1		7	16
2.	I Carbon 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2	08
		1	36
	D. II. Omite Control of Control	7	27
4.	Dominion I I I I I I I I I I I I I I I I I I I		
5.	Maynara	3	40
6.		9	42
7.		.7	05
8.	Bagby-Reynolds 82 3	1	59
	ROUND TRIP—HANDICAP.		
1.	Pearson.		
2.	Maynard.		
3.	Hartney.		
4.	Smith.		
	Worthington.		
6.	Donaldson.		
7.	Manzelman.		
8.	Bagby-Reynolds.		

# Prof. George W. Lewis Appointed Ex-ecutive Officer of the National Ad-visory Committee for Aeronautics

The National Advisory Committee for Aeronautics has recently established the position of the Executive Officer and has appointed Prof. George W. Lewis to fill the position. Prof. Lewis was formerly general manager of the Clarke Thomson Research of Philadelphia. The funds and facilities of the Research were during the war devoted entirely to the development of aircraft engines and in connection with this work Prof. Lewis served throughout the war as a member of the Committee on Power Plants for Aircraft of the National Advisory Committee.

# House Military Committee Favors Pur-chase of Curtiss and Dayton-Wright Properties

Washington, D. C.—The House Committee on Military Affairs decided on November 10 to act favorably on the War Department's request for authorization to purchase the Curtiss Elmwood plant at Buffalo, N. Y., and the Dayton-Wright plant and aviation field at Dayton, O. The cost of the Curtiss property is estimated at \$1,800,000 and that of the Dayton-Wright Company at \$2,700,000.

# Handley Page Carries Express 265 Miles

New York, N. Y.—The Handley Page biplane Atlantic attempted a non-stop flight from Mineola to Chicago on November 14 laden with 1,500 pounds of express and carrying eight persons. those aboard were Vice-Admiral Mark Kerr, Major Herbert Brackley, chief Kerr, Major Herbert Brackley, chief pilot; Col. Archie Miller, commander of Mitchel Field, and Douglas Malcom, of the American Railway Express Company, who travelled as the first American air express mesenger. The express shipment consisted of women's suits and furs.

The start was made several hours later than scheduled owing to the difficulty in starting the engines in the low tempera-ture which prevailed. Several hours after the start was made Admiral Kerr reported by telegraph that the intense cold had caused trouble with the cooling system and

forced a landing at Jewett, Pa.

The flight was resumed on November and a forced landing made at the North The Randall Race Track at Cleveland. wings were badly damaged by a collision with the race track fence.

# Spokane Offers Good Conditions for Winter Flying

Spokane, Wash.—The Aviation Committee of the Spokane Chamber of Commerce under the Chairmanship of J. C. Ralston is preparing for early spring crosscountry flying. The winter conditions pre-vailing east of the mountains and the severe conditions along the coast have practically ended winter cross-country flying. However, in the Inland Empire, as the territory about Spokane is known, conditions for all year around flying are

Spokane has two excellent landing fields, both of which can readily be made of these fields is 900 feet from north to south and 2,000 feet east to west. Prevailing winds are in the latter direction. No north winds are encountered on this field owing to protecting foothills, and emergency landing ground is available on all four sides. The field is level as a It lies at a slight elevation so that machines gain 20 to 30 feet of altitude immediately on taking off. A hangar for four machines has been constructed and machine shops, housing and tankage for fuel and lubricating oils will be added at

Spokane's second aviation field is at Parkwater and is owned by the city. It has been extensively used during the past season but probably requires some expenditure to bring it up to the federal standard.

The Aviation Bureau is preparing a two color tontour map showing the Montana entrances to the Spokane section. Steps will be taken to insure a constant supply of fuel, lubricants and spares,

# 9,823 Miles Covered in Rim Flight

Washington, D. C.—Lieut. Col. R. S. Hartz, J. M. A., report on the "rim" flight has been made public by the Information Group of the Air Service shows that he covered distance of 9,823 miles in a flying time of 114 hours and 25 minutes. The journey required 100 flights, the longest of which was the 857-mile jump from San Diego, Cal., to El Paso, Texas, negotiated in 7 hours and 10 minutes. On the tiated in 7 hours and 10 minutes. On the day following this flight, the Martin biplane flew the 572 miles from El Paso to Fort Worth in 5 hours 40 minutes. The third longest lap of the flight was the 456 miles from Montgomery, Ala., to Pinehurst, N. C., which required 5 hours and 35 minutes to accomplish.

Col. Hartz's flight began on July 24th and ended on November 9th at the starting point, Bolling Field, near Washington. He used Martin bomber No. 39056. Lieut

He used Martin bomber No. 39056. Lieut. Ernest E. Harmon and Mechanics Jack Harding and Jerry Dobias accompanied Col. Hartz.

The elapsed time of the flight was greatly prolonged by a landing accident at Jay, New York, caused by fog and storm. Jay, New York, caused by fog and storm. Over a month was spent in completing repairs at this point. Another week was lost at Milwaukee, awaiting a shipment of tires. Ten days were spent at San Diego for an overhaul. Other delays of a day or two days were occasioned by weather, minor repairs, official appointments and addresses, but the schedule of the journey shows that with the organical the journey shows that with the exception of the three interruptions mentioned above, flying was carried on practically every day of the elapsed time.

Of the 114 hours 25 minutes flying time,

104 hours 24 minutes were consumed in circumnavigating the border. 5,225 gallons of gasoline and 294 gallons of oil were consumed. The engines were run 24 hours 45 minutes in addition to the flying time. The highest altitude attained was time. The 13,000 feet.

The dates of arrival at various points was as follows: Start, Bolling Field, July 24; Augusta, Maine, July 26; Buffalo, N. Y., August 30; Chicago, Ill., September 6; Bismarck, N. D., September 20; Spokane, Wash., September 29; San Francisco, Cal. October 15; San Diego, Cal., October 30; Houston, Texas, November 4; Bolling Field, November 9.



President Platt of the Humboldt Aero Club congratulating Aviator Murray for piloting the Club's first aeroplane to Eureka



## Aeronautical Exposition in Chicago Next January

Chicago, Ill.—The first aeronautical exposition ever held in Chicago is being organized by an Executive Committee headed by George W. Browne, the local Curtiss agent, with headquarters at Congress Hotel. The other members of the Executive Committee are John Burke, of the Congress Hotel; A. C. Barber, district manager of the Overland Company; Stewart Spalding, of the Coliseum Company, C. G. Kenworthy and Walter Hempel, secretary. The Exposition will be held at the Coliseum the week of January 8th. The demand for space has been so great that the management has decided to set aside the Annex for the accessory exhibits. The Curtiss Aeroplane & Motor Corporation occupies the largest space, eight thousand square feet is their allotment, and they will be able to show all of their 1920 models of their output. Among their exhibit will be the new Curtiss "Eagle", a multi-passenger touring limousine, and the altitude record holding "Wasp" tri-plane. The Goodyear Tire & Rubber Co. will occupy four thousand feet of space, and will feature their exhibit with a new type of dirigible. The Dayton-Wright Company will have two of their latest planes on exhibition, and the Aeromarine Plane & Motor Corporation will center their attention on hydroaeroplanes and flying boats. The Packard Motor Car Company will show their newest Liberty motors, and the Wright Aeronautical Corporation the famous Hispano-Suiza motors.

The exposition will show the progress which has been made in developing the aeroplane adapted to peace use from its warlike predecessor, bristling with guns, armament and bombs, and sacrificing comfort and carrying capacity for speed, manoeuvrability, and climbing ability. Enclosed cabins, observation platforms and comfortable chairs in the aerial pullmans will be among the improvements over war planes on display at the Coliseum. Sea-

planes and sport planes for private owners and huge long distance passenger carriers will indicate the possibilities of commercial application of existing types of aircraft. The recent successful use of aircraft for various experimental commercial ventures has proved the case for the aeroplane and nation-wide interest is therefore being centered on the Chicago exposition.

# Curtiss Eagle Carries 476 in 10 Days

Washington, D. C.—The new eight-passenger Curtiss "Eagle" aerial limousine made 82 flights on its ten day demonstration trip here and carried 476 passengers, while three Curtiss "Orioles carried 379 passengers in 267 flights. The "Eagle" was piloted by Bert Acosta, and J. A. Morrell, Paul F. Collins and William H. McMullen piloted "Orioles." The latter established a record by carrying more than 50 people in 45 flights during one day.

Among the distinguished officials who took flights in the Eagle and Orioles were Otto Praeger, second-assistant postmaster-general and head of the aerial mail; General Charles T. Menoher, Director of the Air Service; Benedict Crowell, second assistant secretary of war; Mrs. Newton D. Baker, wife of the Secretary of War; Mrs. George Barnett, wife of the commandant of the U. S. Marine Corps; General L. E. O. Charlton, British air attache; Herman Lindquist, speaker of the lower house of Sweden, and Lieut. Commander P. N. L. Bellinger, of the NC-1.

Three United States senators made trips over Washington in the Eagle—Harry S. New, of Indian; I. L. Lenroot, of Wisconsin, and Carroll S. Page, of Vermont.

Among the representatives were: A. E. B. Stephens and C. J. Thompson, of Ohio; Clark Benedick, of Rhode Island; Sidney Anderson, of Minnesota; H. E. Hull and W. R. Green, of Iowa; Patrick McLand, of Pennsylvania; W. B. McKinley, and W. E. Brooks, of Illinois, and W. P. Martin, of Louisiana.

In addition many foreign diplomats and embassy attachés were carried as well as

various aeronautic authorities and the relatives of representatives, and cabinet officers

# New Aviation Field for Spokane

Spokane, Wash.—The Symons-Russell Aviation Company has leased an excellent plot of ground one thousand feet wide by one-half a mile long but four miles from the city's center. The field is of gravel and is firm under all weather conditions. It lies about fifteen feet above surrounding fields and has practically no obstructions. Proper markings are being placed. The first unit of hangar, 80 x 52 feet, is already finished. Oil and gasoline tanks and pump are being installed and a complete supply of aircraft necessities will be kept in stock. Electric heating is available for keeping radiators warm and a staff of mechanics is prepared to undertake all necessary repairing. Markers are being erected on the field.

Already six hundred passenger flights have been made at this field without a mishap or forced landing. An aviation school is being conducted under the supervision of Thomas J. Symons, Jr.

# Doehler Die Castings Company Purchases Chicago Plant Site

Brooklyn, N. Y.—The Doehler Die Castings Company, whose main offices and Eastern plant are located here, have just completed negotiations for the purchase of a seven-acre factory site on which the company will erect a modern one-story concrete steel and brick structure for the manufacture of die castings and bearings. Contracts for the building have already been let and it is to be ready for occupancy about January 1, 1920. The output of the Brooklyn and Toledo plants proved insufficient with the increased demand for die castings in white metal, aluminum and brass alloys and bronze back and aluminum back lined bearings, although the output of the company with its present facilities is exceeded by only a very few plants in the world.



Nieuport monoplane with 180 Le Rhone engine. It has a speed of 228 kilometers an hour, and climbs 6,000 meters in 19 minutes

Albert S. Burleson, Postmaster General Otto Praeger, Second Assistant Postmaster General B. Corridon, Superintendent, Division of Aeral Mail Ser Louis T. Bussler, Chief of Maintenanice and Equipment J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M, Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader

Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton Robert H. Ellis James H. Knight Elmer G. Leonhardt Paul S. Oakes Paul W. Smith Frederick A. Robinson Max Miller F. A. Nutter

The Modified De Haviland Mail Plane

Washington, D. C.—The first speed tests of the modified De Haviland 4 biplanes of the modified De Haviland 4 biplanes were made on July 15. Standard DH-4 types have been changed to twin engined machines, using two 150-horsepower Hispano-Suiza engines. The wing area has been increased by a new and strengthened center section to take care of the extra load. In the initial test the single rudder was found inadequate and consequently this has been replaced by twin rudders.

A speed of 103 miles an hour with both engines running and nearly 80 miles an hour with one engine was obtained. In the preliminary models the motor was not stream-lined so that a greater speed is no doubt obtainable. The machine is designed to carry a mail load of 600

designed to carry a mail load of 600

pounds instead of the 450 pound load now carried by the single Liberty engined De Haviland Fours.

Further experiments with this type of plane are being made with a view to using two Liberty engines and thus obtaining greater speed and carrying ca-

The following is a summary of the first tests:

Load: 408 lbs. sand in front mail compartment; 3 gallons oil in each tank; 65 galls. gasoline; pilot, 175 lbs.

Speed tests (one-mile course): Two engines: (1) 103½ m.p.h. (2) 103 m.p.h. (3) 104 m.p.h. Single engine: (1) 78 m.p.h. (2) 81 m.p.h.

Performance: Air speed with wind (20

mile wind along course), 112 miles; against wind, 101 miles.

Condition of engines: Tuned to 1600 r.p.m. on ground. Oil pressure, 60 lbs. Temperature of water on take-off, 150 degrees; maximum through tests, 180 degrees. Speed of engine against wind, 1650 r.p.m.; with wind, 1700 r.p.m.

Martin Mail Plane Makes First Regular

Washington, D. C.—Carrying 746 pounds of mail, the first of the new martin mail planes made a non-stop flight from Belmont Park to Washington in 3 hours and 10 minutes on November 18. This plane is equipped with a releasing device which permits of despine mail along the which permits of dropping mail along the

# UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-WASHINGTON ROUTE

Monthly Report of Operation and Maintenance SEPTEMBER, 1919

		1			uel,			-5					SERVICE AND UNIT COST					
Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
12 14 31 32 34 35 36 39A 42 43 77 79 85 110 44301 44305	\$4, 46 8, 40 192, 29 74, 64 38, 63 177, 73 292, 96 18, 00 29, 48 19, 83 14, 90 3, 78 19, 34	\$2.41 1.08 91.26 22.60 14.42 104.16 84.87 15.12 7.74 4.00 5.89	\$36.56 36.56 36.56 36.56 36.56 36.56 36.56 36.56 36.56 36.56 36.57	\$35, 29 35, 30 35, 30 35, 30	\$12.35 12.35 12.36 12.36 12.35 12.35 12.35 12.35 12.35 12.35 12.35 12.35 12.35 12.35	\$53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21 53.21	\$23.35 15.35 192.61 107.24 37.99 364.74 300.86	\$35.81 21.32 263.47 191.49 212.06 481.66 377.01 64.56 63.30 46.69 37.76 35.82 48.87 50.93 48.59 19.03	\$1.94 60.49 11.75 71.34 56.13 131.85 .10 15.00 4.90 29.52 13.06 4.183 8.65 6.21	\$11.56 46.24 72.50 72.50 72.50 72.50 72.50 72.50 72.50 12.50 12.50 12.50 12.50 12.50	\$52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.28 52.29 52.29	\$269.22 282.08 1,062.31 669.91 636.63 1,446.61 1,449.74 329.35 373.61 313.78 319.68 292.14 334.10 294.98 284.07 287.18	40 28 660 252 125 638 1,014 	hr. min 3 04 2 00 25 38 14 15 5 01 48 35 40 04	219 60 2,305 1,274 481 4,246 3,513 178 218 90	5.1 2.4 3.5 5.1 3.8 6.8 3.5  2.6 3.4 5.0	\$87.60 141.08 41.40 46.98 132.60 303.60 297.60 	\$1.22 47.00 .46 .52 1.42 .34 .41  1.79 1.34 3.71 
Total	\$894.44	\$358.66	\$584.99	\$564.68	\$197.60	\$851.36	\$1,193.21	\$1,998.37	\$452.77	\$712.80	\$836.51	\$8,645.39	3,044	158 30	13,106	4.3	\$54.55	\$6.60

# B. A. T. TYPES

Illustrated on the right the F.K. 27



# B. A. T.—"F. K. 27"

THE F. K. 27 is a two-seater sporting biplane, manufactured by the British Aerial Transport Co., Ltd. Its chief characteristics are as follows:

characteristics are as follows:	its chiei
Engine: Type	Vasp" II 200
Weight of machine: Empty, lbs	855
Range in miles	1.475 480
Speed (m.p.h.): Ground level	135
5,000 ft. 10,000 ft.	134 130
Landing Speed: m.p.h	50 <b>3</b>
Climb (in mins.) to: 5,000 ft	71/2
Ceiling: ft. 15,000 ft	15
Leads: Per sq. ft., lbs	7
Per h. p., lbs	7 400
Length (over all): ft. ins	20′ 7′′
Height (over all): ft. ins	
Bóttom, ft. ins.	
Bottom, ft. ins	3' 0"
Wing Area: Top, sq. ft  Bottom, sq. ft	
· Total sq. ft	200

Gap: Ft. ins. Dihedral: Degrees	3	11"
Alleron Area: Each sq. lt		7.5
Total sq. ft		15 17.1
Elevators, sq. ft		.6.3
Total sq. ft		23.4
Area: Fin., sq. ft		2.85 4.4
Total sq. ft		7.25
Propeller: Type B.A. Blades	Г. Т	ractor
Diameter	7'	10"
Pitch		
Speed, r. p. m	. 1,	hrottle
Gallons		30

# B. A. T. "Basilisk"

THE "Basilisk" is an interesting single-seater military biplane, manufacturer by the British Aerial Transport Co., Ltd. Its chief characteristics are as follows:

Engine: Type	
H. P	320
Loaded, 1bs	
Range in miles	500



The B. A. T. Basilisk, a single seater military biplane with A. B. C. Dragon Fly Engine

Speed(m.p.h.): Ground level 162	Range in miles
5,000 ft	Speed (m.p.h.): Ground level
10,000 ft	
15,000 ft	• 5,000 ft
Landing Speed (m.p.h.)	10,000 ft
Climb (in mins.) to: 5,000 ft	15,000 ft 127
10,000 ft 4.33	Landing speed, m.p.h
15,000 ft 9.33	Climb (in mins.) to: 5,000 ft
Ceiling	10,000 ft 7.33
Per h. p., lbs	15,000 ft 14
Useful or Military Load, lbs	Ceiling, ft(service) 26,000
Length (over all) ft. ins	
Height (over all) ft. ins	Loads: Per sq. ft., lbs
Span: Top, ft. ins	Per h.p., lbs
Bottom, ft. ins	Useful or military load, lbs
Chord: Top, ft. ins	Length (over all), ft. ins
Bottom, ft. ins	Height (over all) ft. ins
Bottom, sq. ft 102	Span: Top, ft. ins
	Bottom, ft. ins
Total sq. ft	Chord: Top, ft. ins
Gap, ft. ins.	Bottom, ft. ins
Dihedral: Degrees	Wing area: Top, sq. ft
Aileron Area: Each, sq. ft	Bottom, sq. ft
Total sq. ft	Bottom, sq. 1t
Elevators, sq. ft 8.3	T-4-1 f4
	Total sq. ft 185
Total sq. ft	Gap, ft. ins
Area: Fin, sq. ft	Dihedral, degrees °
Rudder, sq. ft 4.5	Aileron area: Each, sq. ft
Total sq. ft 7.1	Total sq. ft
Total sq. ft	Area: Tail-plane, sq. ft
Blades 2	Elevators, sq. ft
Diameter 8' 8"	
Pitch 8' 5"	Total sq. ft
Speed, r.p.m	
Tank Capacity: Hours	Area: Fin, sq. ft
Gallons 40	Rudder, sq. ft
	Total sq. ft
B. A. T. "Bantam"	Propeller: Type
IIE Duitide Comitee Townsont Co. Tad. of Tourism one	Blades
THE British Service Transport Co., Ltd., of London, are building this small military and sporting biplane. Its	Diameter
characteristics are as follows:	
Engine: Type	Pitch 5′ 4″
H.p 170	Speed, r.p.m
Weight of machine: Empty, lbs	Tank capacity: Hours
Loaded, 1bs	Gallons 22



The B. A. T. Bantam. A small military and sporting biplane

# THE CARE OF AEROPLANE WOOD

By F. J. HALLAUER\*

THE object of this article is to indicate the precautions necessary in storing and shipping aeroplane stock. It is very desirable that aeroplane stock be kiln-dried at the mill before any shipment is made, and some air-drying should al-ways be done. Careful open piling in-cludes protection from the sun and provision for the free circulation of air. Lumber should be protected from the weather during shipment. Humidity control during manufacture alleviates trouble from shrinkage and swelling. Lumber for overseas shipment should be sufficiently air-seasoned prior to shipment to get rid of excess surface moisture.

# Refined Storage Methods Essential

The production of finished aeroplane stock of the highest quality requires proper care of the material at all times.

The advantages accruing from the seasoning of wood are these: (1) It reduces weight, (2) it increases strength, (3) it does away with subsequent shrinkage and change of form, and (4) it prevents and forestalls the action of decayproducing organisms. But for use in aeroplane construction the ordinary significance of successful seasoning is increased many fold through the unusual importance that is attached to stability of dimension, closeness of adjustment, balance, and the ratio of strength and weight.

Complete equilibrium of moisture control between the wood and the surrounding atmosphere is necessary during seasoning. If the process of adjustment of moisture content, either by natural or artificial drying, proceeds too rapidly or under unfavorable circumstances so that any portion of the wood dries more rapidly or to a greater extent than another portion, damage to the stock results through checking, twisting, or casehardance, and the ratio of strength and weight.

# Checking and Casehardening

The shrinkage of different parts of a piece of stock at different rates often results in checking or separation of the fibres. If the strength and elasticity of the fibres is such that this difference in shrinkage of individual cells is resisted or compensated for, internal stresses are set up which greatly impair the quality and strength of the wood. The presence of such fibre stresses creates a condition known as casehardening.

# Sap Stained, Mold, and Decay

On the other hand, if provision is not made for a sufficient rate of drying from the green to the seasoned state, the conditions, which may be considered un-sanitary for wood, result in damage through sap stain, mold, and decay.

Sap stain of wood is the result of the

activity of external organisms, or, sometimes, of mere chemical reactions, which are favored in green, sappy wood when surface drying is excessively slow on account of poor circulation of air. The damage consists of a permanently discolored and suspicious-looking surface even though the strength of the even though the strength of the wood is not impaired.

<sup>5</sup> Formerly in charge of the Section of Timber Physics, Forest Products Laboratory, Madison, Wie

Mold is a result of the same conditions which are favorable to the development of sap stain. The latter usually makes a more vigorous growth consisting of a dense mat of fungous threads that oftentimes covers the surface of the lumber and greatly hampers if it does not en-

and greatly nampers in it does not trively prohibit the drying process.

Actual decay of stock oftentimes develops under the cover of sap stain and mold, or it may develop independently. In its incipient stages, decay in wood may not be distinguished by its appearance except under the microscope, and yet the strength of the wood may have been greatly impaired already by the corrosive action of the decay organism. Like stain and mold decay results from agencies working from without the wood itself and indicates the lack of lumber sanitation and the proper precaution in hand-

# Advantages of Kiln-Drying Before Shipment

The surest means of producing and maintaining conditions favorable to the proper seasoning of wood is the use of a properly constructed and controlled dry kiln. For that reason great advantage comes from being able to kiln-dry the stock immediately after it is sawn from the log and previous to any shipment or storage. Moreover, the advantages can hardly be over-estimated of being able to ship wood with the guarantee that it has been dried under specific conditions and will arrive at its destination in a practically perfect condition without mold checking, and ready for use. The saving in freight and transporta-

tion amounts to a very large sum. Green lumber may contain from about onethird to two and one-half times its ovendry weight of water. Expressed in percentage, this is from 33 1/3 to 250 per cent moisture, based on the oven-dry If it is dried from 60 to 10 per cent before shipment, the saving in weight is 50 per cent of the dry weight of the wood, or 33 1/3 per cent of the green weight.

If drying is conducted at the mill, the material can at once be sawed and dried in stock sizes. This saves much material and reduces transportation costs, since only the acceptable pieces need be shipped.

Where large quantities of lumber are being cut, the centralization of the drying operations at the point of production makes possible more efficient management of those operations and assures better and more uniform results. one disadvantage of this plan seems to be the fact that the material probably reabsorbs some moisture during transit and has to be re-dried at the factory before its manufacture. However, the re-drying of the material can be conducted without injury in almost any kind of a suitable dry kiln, and requires but a few days, because most of the water in the center of the piece has already been removed.

# Care of Stock in Storage

In handling and storage of stock that has not yet been conditioned to a point of equilibrium with the surrounding atmosphere, the matter of piling is an extremely important consideration. piling should be carried out with an inview and of the results that are to be obtained. Too often the lumber is piled with the sole purpose of economizing space, whereas, in truth, this should be

considered a secondary object.

Green Lumber.—Whenever aeroplane stock in storage is to be subjected to outdoor atmosphere conditions commonly called yard storage, the ordinary rules applying to good practice in piling lumin the yard must be followed. planks should be placed on strong level foundations that are at least 1½ feet above the ground and not more than 4 feet apart. The piles should be comfeet apart. The piles should be com-pletely shielded from the sun and from strong winds. If necessary, properly ven-tilated sheds should be built. Too rapid drying in the air will pro-

duce checking and casehardening. The drying should be uniform from both sides of the planks and throughout the pile. Tendencies to end-checking may be minated, especially in the case of hardwoods, by coating the ends with linseed-

oil paint or glue size. When lumber is to be shipped prior to kiln-drying, it should be air-dried, as described, for at least one week before shipment. This allows the surface to become sufficiently dry to minimize the development of superficial fungi during

If the facilities at the drying plant are such that lumber can not be loaded into the kiln immediately after sawing, the stock must be open piled, as described, to prevent the development of mold and stain, which form even within the com-paratively short time before it is run into the kiln.

Upon arrival at destination of lumber shipped green the stock should either be loaded directly into the dry kiln or open piled if it must be stored for any length

time.

Kiln-Dried Lumber.-Lumber that has been kiln-dried should be placed in an open pile in some storage room for approximately two weeks, in order to equalize its moisture content. This room should not be excessively dry, since it is required that none of the material shall be dried below the minimum of 5 per cent moisture and that it shall maintain an average of 8 per cent. If the lumber is taken directly from the dry kiln and placed in a heated room near steam pipes or radiators, where the humidity may drop as low as 15 per cent, it will continue to dry with possibly some checking and casehardening. With high humidities it will take on moisture.

It is desirable to keep dry stock in an atmosphere of about 40 to 50 per cent humidity. A wet and dry bulb hygrometer should always be kept in the storage room in order to determine

storage room in order to determine what the conditions are. During the rainy seasons the humidity out of doors is likely to run high and at times may reach practically 100 per cent, while in winter it may run lower than desired. Artificial heat in the storage room lowers of the outside air. Heat would, therefore, be beneficial during damp, warm weather, but would make the air too dry during winter unless the humidity were

increased to the desired amount by introducing moisture into the room.

It is also highly important that the

lumber should all be subjected to uniform conditions. If the bottom of the pile is close to a damp cement floor and the top near steam pipes or a hot ceiling, the conditions for storage are very bad. Under such circumstances warping is very likely to take place.

The injury produced by neglecting such points as are outlined here will not in all cases be equally serious, but will, of course, depend upon the use to be made of the particular pieces of wood.

# Care of Stock During Shipment

Green Lumber.-As previously stated, the shipment of green stock is to be strongly discouraged. Such stock is subject to damage from two causes. If it is piled open and exposed, it may be If it subjected to too rapid drying, and if it is piled close or in a closed car, mold and even decay may develop. The best that can be done is to effect a com-promise. The stock should be given a preliminary air-drying that would affect the surface at least and thereby greatly decrease the danger of mold and decay. During shipment, also, the stock should be handled in such a manner as to prevent injury from too rapid drying. It may be close piled in open cars, but should be protected from the hot sun. results the ends should be best

coated prior to the air-drying.

Kiln-Dried Stock.—Lumber that has been given the preliminary kiln-drying prior to shipment should be loaded directly from the dry kiln into the car. The material should be close piled during shipment to minimize the reabsorp-tion by the lumber of moisture from the atmosphere. Obviously, it should be entirely protected from weather conditions, and it is preferable that shipment should be made in tight box cars; or, if these are not available, a tight covering of boards or of boards and building paper should be built over the piles.

# Care of Stock During Manufacture

It is a well-known fact that wood changes in moisture content, size, and strength properties with changes in the humidity and temperature of the surrounding air. In the Central and Eastern United States wood sheltered from precipitation and subjected to outside temperatures throughout the year contemperatures throughout the year contains from 10 to 15 per cent moisture, while the same wood when brought into the heated shop in midwinter drops to a moisture content of about 5 6 per or cent. The time required for this change, however, varies with the size of the piece, the species, etc.

This change in moisture content probably does not materially change the strength properties of the wood, nor should it normally cause much trouble from checking. The change in size from shrinkage may, however, be of considerable importance, since it affects the fit of the parts, and in glued construction the unequal shrinkage of various pieces may throw selatively large stresses upon may throw relatively large stresses upon the glued joints and thus cause failure. If the material is allowed to come to

moisture equilibrium in the shop before working, difficulty will not be experienced once, but trouble may be expected after the parts have been placed in service and have had opportunity to re-absorb moisture and swell. No varnish or other ordinary coating will prevent such a change of moisture content. Such

coatings do, however, very greatly retard changes of moisture content. From the foregoing it will be seen that it is very desirable to make shop conditions such as will maintain material at practically the same moisture content it would attain out of doors.

Humidity control should be established for all shops where propellers are made of wood, and it is very desirable in all other shops where wood parts are made and machines are assembled. By such control, much may be done to avoid the continual annoyance caused by change in the size of specimens, possible failure of parts due to change in moisture, with the consequent twisting, warping, and open-

ing of glued joints.

Partial relief may be obtained by sprinkling floors frequently and by keeping the winter temperature as low as is consistent with the health and efficiency of employees. The most reliable method of controlling humidity is by a system of forced ventilating, or by direct injection of moisture into the air in a sufficient quantity to counterbalance the condensing effect of windows.

In an ordinary factory with broad, single-glass window space, it is not practicable, according to Tiemann, to raise the humidity above the point at which the temperature of the window glass represents the dew-point of the air in the room. If the air outdoors is zero in temperature and the air in the room is 70 degrees, the temperature of the window-panes will range in the neighborhood of 35 degrees and the humidity will, therefore, approximate 30 per cent, even though considerable moisture be injected into the air. On the other hand, if the temperature outdoors should rise to 40 degrees, the temperature of the window-panes would average about 55 degrees and the humidity would rise to 60 cent, but not exceed this, because of the condensing effect of the windows. By using double sash the temperature of the windows and, consequently, the humidity may be raised.

As soon as the wood has been thoroughly varnished its liability to injuries due to these changes in moisture content is reduced to a minimum. The varnishing of the wood does not entirely eliminate its tendency to lose moisture and, consequently, to swell and shrink; nevertheless, a good treatment of var-nish will so retard this action that lit-tle further trouble need be experienced.

# Care of Stock for Overseas Shipment

The necessity of shipping stock overseas under conditions of transit that are conducive to checking and decay demands especial attention and care in the

handling of such stock.
From the standpoint of losses incident to overseas shipments, it would be preferable to kiln-dry the stock at the point of production to a condition of approximately 15 to 18 per cent of moisture. However, when the stock is cut into very large flitches, 4 inches or more in thickness, and shipped overseas in sizes large enough for the purposes of the various aeroplane factories, the value of a cutting-up plan and a kiln-drying scheme prior to shipment is doubtful.

Lumber that is to be shipped overseas without previous kiln-drying should be air-seasoned for a sufficient length of time to get rid of excess surface moisture. If the lumber is shipped in the hold of a vessel, the layers should be separated by stickers at least ½ inch thick. On account of mold and surface rot, which

is reasonably sure to occur in long-distance shipments of green wood by water, it is desirable to handle the material in flitches as large as possible so that the surface area of the stickers may be as small as possible. With the proper use of stickers between the layers of stock, air-drying proceeds so rapidly in a properly ventilated hull that within the time required for transit the moisture content has almost reached that of equilibrium with the atmosphere of a maritime climate, such as prevails near the coasts of Western Europe. In such cases only a final drying process is required to bring the stock to complete equilibrium with the normal atmosphere.

"Aeroplane Design and Construction"

By Ottorino Pomilio
The book by Ottorino Pomilio,
lane Design and Construction" (Mc-Graw-Hill Book Company, Inc.), presents in greater detail than has hitherto been attempted in America, the application to practical aeroplane design of aerodynamic

research conducted abroad.

In the calculation and design of commercial and pleasure types of aeroplanes this book should materially assist in re-placing by scientific procedure many of the "guess-work" methods often employed. The arrangement, presentation of subject matter and explanation of the derivation of working formulae, together with the theories upon which they are based, and consequently their limitations, are such that the book lends itself to use as a text in technical schools and col-

A feature often slighted in such works is the presentation of carefully prepared and adequate diagrams, and it is in this very item that Mr. Pomilio's book stands far above the ordinary; there are nearly 250 line drawings and diagrams of the neatest and clearest character, assisting considerably in the better comprehension of the text, and aiding in no small way the attractiveness and interest of the

problems under discussion.

Four parts or divisions are made-Parts I, II and III deal with the structure of the aeroplane, and Part IV the design. In the six chapters of Part I, the following subjects are discussed: Wings, control surfaces, fuselage, landing gear, engine and propeller. Part II deals with elements of aerodynamics, the glide, flying with power on, stability, manoeuvrability, and flying in the wind. Part III deals with problems of efficiency, speed, climbing, great loads and long flights. Part IV, concerned with the problems of design, has six chapters devoted to materials, planning the project, static analysis of fuselage, landing gear and propeller, determination of the flying characteristics, sand tests-weighing-flight tests.

An appendix for the convenience of the designer gives tables, squares and cubes of velocities, cubes of R. P. M. and per second and a table giving the fifth powers of the diameters in feet.

"Airplane Design and Construction," by Ottorino Pomilio, can be secured through the Aeronautic Library, 299 Madison Avenue, New York City, for \$5.00 net, including postage.

# THE THIRD PAN AMERICAN AERONAUTIC CONGRESS

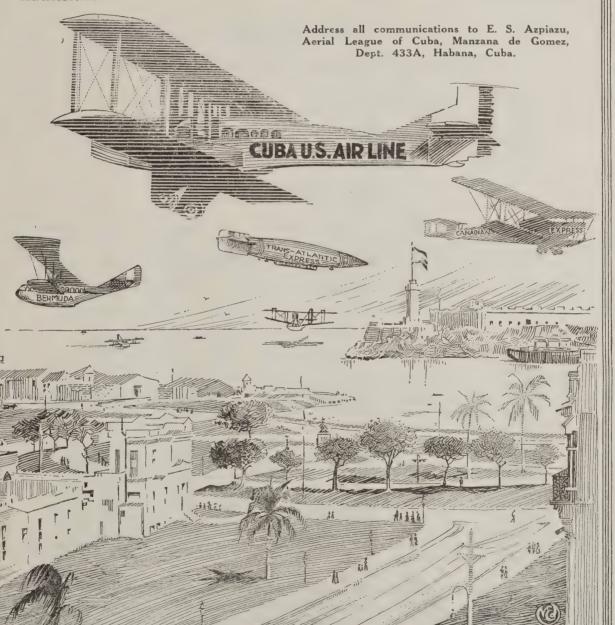
WILL BE HELD AT

# HAVANA, CUBA FEBRUARY 21st to MARCH 1st

UNDER THE AUSPICES OF

The Liga Aerea Cubana, The Aero Club of America, The Aero League of America, La Federacion Aeronautica Pan Americana, and the Aerial Touring Association.

Exposition of World's Best Aircraft. Competitions for over \$25,000 in Prizes. Discussions of Important Phases of Aeronautic Science by World's Leading Authorities.



El Tercer Congreso y Exposition
Aeronautica Pan-Americana

Celebrada bajo los auspicios de la "Liga Aerea de Cuba," el "Aero Club de America," la "Liga Aerea de America," la "Federacion Aeronautica Pan-Americana," y "Asociacion del Turismo Aero."

Desde el Sabado, Febrero 21 hasta el primero de Marzo ambos inclusives de 1920, en la Habana, Republica de Cuba.

PROGRAMA.

Concursos que se verificaran todos los Dias

1. Concurso de Hidroacroplanos (eu general).
2. Trofeo y Premios de Curtiss por aviacion maritima.
3. Concurso de Aeroplanos Terrestres.
4. Concurso de Paracadas.

PROGRAMA DIANO

1. Exhibicion de aeroplanos, motoras y sus accesorias en el Salon de Exhibiciones.
2. Demostracion y Ensayos de Hidroacroplanos, Aeroplanos, Terrestes, Motoras, Globos, Dirigibles y Globos Cautinos para compradores.
3. Vistas Cinemalografas y Discursos sobre las fases mas importantes de lo aeronautica.

Los Gobiernos de los Estados Unios, Argentina, Brasil, Bolivia, Chile, Columbia, Costa Rica, Republica Dominicana, Ecuador, Honduras, Haid; Araman, Guatemale, Paraguay, Peru, Petuga, El Salvador, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Petuga, El Salvador, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Petuga, El Salvador, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Petuga, El Salvador, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Petuga, El Salvador, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Portaga, Espana, Uraguay, Venizuela, Majico, y Nicaragua, sai como los Sociedades Aeronauticas, Deportivas, Sientenda, Paraguay, Peru, Portaga, Espana, Venizuela, Majico, Salvador, Paraguay, Peru, Portaga, Espana, Portagor, Paraguay,

Troisieme Convention et Exposition
Aeronautique Pan-Americaine

Sous les auspices de la Ligue Aerrienne de Cuba, l'Aero Club of America, The Aerial League of America, la Federacion Aeronautique Pan-Americaine et l'Association du Tourisme Aerien.

Du Samedi 21 Fevrier, 1920 au Lundi I Mars, inclus. a
HABANA, CUBA

Concours Devant Etre Tenus Chaque Jour. \$25,000 Prix.

1. Councours d'hydravions.
2. Trophee et Prix Curtiss pour Aviation Navale.
3. Councours de Parachutes.
6. Councours de apidits d'ascension, de descente et de manoeuvre pour ballons captifs aux acheteurs eveneuels.
7. Exposition d'Avions, Moteurs et Accessoires.
7. Demonstration et assais d'hydravions et dirigeables, vallons captifs aux acheteurs eveneuels.
8. Transport de passagars par hydravions et dirigeables, et ascensions en ballons captifs.
8. Repesantations cinematographiques et conferences sur les phases les plus importantes de aeronautique.
8. Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a se presenter a l'Etat Major Comite de la Convention a l'Hotel Plaza, Habana, Cuba pour se faire inscrire et recevoir leur insigne et la programme official.

Toutes comunications devront etre addressees a Monsieur E. S. Azpiazu, Exposition Committee, Liga Aerea de Cuba, Manzana de Gomez, Habana, Cuba.

Terza Convenzione ed Esposizione
Aeronautica Pan-Americana

Sotto gli Auspici della Liga Aerea Cubana, dell'Aero Club of America, dell'Aerial League of America, La Federazione Aeronautica Pan-Americana ed the Aerial Touring Association.

Dal 21 Febbraio al Primo di Marzo ad HABANA, CUBA

PROGRAMMA
Gare Che Avranno Luogo Ogni Giorno

1. Gare Idroplani (generale).
2. Voli nautici apparecchio tipo Curtiss-Trofei e Premi.
3. Gare Aeroplani di terra.
4. Gare Dirigibili.
5. Gare Velocita asocsa e discesa, e manovre di Palloni frenati.
6. Gare Paracadute.

AVVENIMENTI QUOTIDIANI

1. Esposizione di Aeroplani, Motori ed accessori.
2. Escroitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili Pallanifrenati.
3. Transporto Aereo passeggeri su Idroplani, e Dirigibili Ascensioni Palloni frenati.
4. Spettacolo cinematografico e discorsi sul elpiu importanti fasi dell' Aeronautica, dell'ordine seguente:

Il Governo d'Italia e le organizzazione italiane di Aeronuatica di Sport e di Scienze d'Italia ed Italiane all estero sono invitati a mandare rappresentanti ad assistere a questo grande evento aeronautico. Arrivando a Habana, Cuba, i Signori Rappresentanti dovranno presentarsi al Quartiere Generale del Comitato al Hotel Plaza, per registrasie ricevere la targhetta ufficiale, nonche il programma.

Ogni comunicazione devra essere indirizzata al Signor E. S. Azpiazu, Exposition Committee, Liga Aerea de Cuba, Manzana de Gomez, Habana, Cuba.

# AERIAL PHOTO-TOPOGRAPHY

By R. PRESTON WENTWORTH

Photo-topographic Engineer (Formerly Assistant, Department of Geology and Geography, Harvard University)

(Continued from page 265)

E have now hastily sketched the major difficulties to be faced from the air. One other source of error, easy of elimination, is from the type of shutter used in the camera. Most of the aerial cameras up to the present time have used focal plane shutters which give a difference in scale in two directions, i. e., parallel and perpendicular to the shutter travel. The use of a between-the-lens shutter will eliminate this practically, or, if the film move in the direction of flight during exposure with a focal plane shutter this error would be greatly reduced.

After the pictures are taken one has to combat the shrinkage of the film in developing and fixing. This is usually circularly symmetrical, amounting therefore only in a slight reduction in scale. If prints are made from the negatives for mosaic purposes the factor of paper shrinkage enters. The latter is in one direction only, but with a reasonable overlap does not present a serious error even though cumulative, for it will not misplace objects through distortion of unequal shrinkage, tied into a control system beyond an amount accepted to-day as reasonable by almost all mapping agencies at the large scale at which these photographic maps are

made up. The remaining great problem to be solved relates to the matter of the effect of ground relief which we mentioned before. This is possible of accomplishment after proper research and experiment. The machine that will eventually accomplish this purpose and at the same time be utilized for obtaining contouring as well as obtaining the correct positions of prominent cultural features for the plan map will be some form of stereo-autograph or comparator. Such a device as this utilizes the parallax of stereo pairs of photographs, which can be taken successively and determines the true location of a point from the two apparent locations and true location of a point from the two apparent locations, and at the same time by a lever bar system similar to a pantograph registers and plots the data directly from celluloid positives. Other methods and devices may achieve this same end,

but it is yet too early to state with any promise which of the

but it is yet too early to state with any profines which of the several ideas now under consideration and test will accomplish the most accurate result in the simplest manner.

Aerial photographic surveying is a highly specialized branch of the general cartographic field, even though it is orance of the general cartographic field, even though it is only a means to obtain a result. It is a process, however, which bids fair to assume a position of first magnitude in assisting to produce a finished map. The science as a unit necessitates a thorough knowledge of theory and practice in (1) the entire field of aeronautics, (2) photography and (3) cartigraphy. A great many have taken a literary fling at this subject, exhibiting an amusing and varied quantity of animus for some reason or other, and it is quite absurd that an for some reason or other, and it is quite absurd that an embryo science of this nature and importance should be hampered as it has been by a great deal of idle argument and

It is readily apparent from our brief resumé of the science and its problems that to solve the latter practically and simply requires a thorough understanding of the extent, practice and limitations of its aeronautic phase. The camera can be made so that it needs but little human attention, but can be made so that it needs but little furnar attention, but piloting a ship for aerial photography of the standard required from the point of view of aerial phototopography is something that depends entirely on a human element. An aerial photo-graphic pilot of the quality demanded by this science exists graphic pilot of the quality demanded by this science exists but in rare instances, and becomes adept at this art only after long experience. All his skill and judgment are required in addition to the ordinary strain of flying, to maintain his elevation, keep his ground speed constant and maintain a fixed course without variation with respect to the ever-changing conditions of the air. Upon his success or failure in these respects depends a great deal the utility of the photographs that are obtained for mapping purposes. Belittlement of this fundamental necessity of this science is beyond comprehension. Still further it is also apparent that by far the larger sion. Still further it is also apparent that by far the larger part of the problems to be solved are those which pertain

Aerial Photography Shows Industrial Development and Inter Communicating Facilities Which Are of Great Interest to Enterprising Communities



directly to the photographic phase of the science. In order to solve these one must naturally be more than familiar with the photographic practice, and especially the conditions and practice of aerial photography. In fact, a complete knowledge of photographic principles is necessary to work out many of the large problems. Aerial photography as an art is much more exacting than terrestrial photography, for conditions of light, haze and subject are constantly changing. Cameras can be built of sufficient universal adaptation to include the extreme ranges of conditions, but only a man trained in the precise technique of this art can handle that camera so that it accomplishes uniform and perfect results from the air. Truthfully, of course, good pictures are not absolutely necessary in the production of a perfect map, for a good picture may be so badly distorted as to be of no use, while on the other hand a poor picture, photographically, may be absolutely correct and of great value for this purpose. This, however, is not an argument of importance, for it is the question of camera construction, lenses, shutters, sensitized products, exposure problems, optical geometry, etc., which, while fundamentally the same, have their peculiar problems and adaptations in aerial photography that express the photographic phase of the subject of aerial photography for map making.

Thirdly, at least a fundamental knowledge of cartograhic principles is necessary by those directing the work, but is not essential to those carrying out the work. It is an engineering job to lay out whatever ground control is necessary and it is an engineering job to finish the map from the pictures, but only an engineer thoroughly familiar with the conditions of flying and aerial photography can intelligently handle these co-operative projects. Our Army Air Service, through its Aerial Surveying Section, has built up an organization which is efficient and thoroughly capable of directing projects of this nature, co-operating in its projects with and calling for whatever engineering assistance is necessary from the other map-making agencies of the Government. Proportionate with

the solution of the various problems now extant in aerial surveying, the amount of necessary initial ground control will diminish undoubtedly.

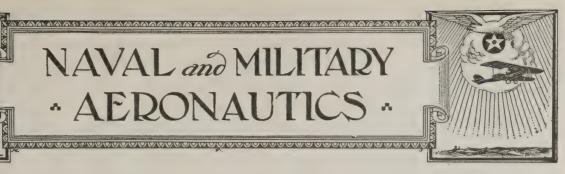
In conclusion, then, it is seen that up to the present time only two advantages are available from this new scienceone, the ability to correct and bring up to date existing maps, and the other the ability to make the new picture maps, more or less accurate, according to the circumstances. It is to be hoped that the Government will sufficiently realize the value and importance of this new asest so that research may continue and assist in solving the remaining problems, but the present state of ennui seems to preclude this hope. Undoubtedly commercial organizations will take up and continue this work, however, so that eventually we can reap the benefit of this new science. It must be remembered that while there may be a certain amount of percentage errors remaining, even with the solution of some of the problems, in the assemblage of photographs, when this data is compiled and plotted from the original enormous scale of the assemblage to a small usable size scale, even though the percentage error must still exist, it is mostly an immeasurable quantity at the smaller scale, and hence from all practical points of view no error at all. Opportunity is also provided now for a universal scape of maps so that, for instance, the entire United States can be mapped and the maps printed in small atlas sheet size, but these small sheets could be assembled into a huge map of the whole. At present this is a physical impossibility, for maps of varying scales occur frequently, even though adjoining, seriously hampering one's use of them if an assembly is desired. This occurrence is necessitated by the character of the area to be surveyed and its population, but with aerial surveying the area is covered anyway and the final scale of the map produced for the area from these photographs is entirely within the control of the compiling organization and can be made as easily at one scale as another at the same expense.



In the Aerial Photography Real Estate and Insurance men have graphic business details



# NAVAL and MILITAR · AEDONAUTICS ·



Reversible and Variable Pitch Propeller Tested at Dayton

McCook Field, Dayton, O.—A variable pitch and reversible propeller, the invention of Seith Hart, of Los Angeles, California, was successfully tested here recently, according to an announcement made at McCook Field. The climbing speed of the plane is increased by forty per cent. and it is stated that it makes possible the attainment of altitudes of 50,000 feet with present day planes. The 000 feet with present day planes. The possibility of landing in a small space, stopping the plane by means of the propeller acting as a brake, is looked upon as a great advance for commercial aeronautics, as landings on the roofs of buildings will greatly increase the utility of the aeroplane. The increased efficiency and flexibility at high altitudes attained by the variable pitch feature will make the aeroplane a new factor in commerce.

Department of Agriculture Praises Air Service Forest Patrol Washington, D. C.—The Secretary of

Agriculture, in a communication to the Secretary of War, expressed his appreciation of the efficient work of the War Department's forest fire patrol. He states that this year was an unusually severe one and that it fully demonstrated the efficient and that it fully demonstrated the efficiency of aerial forestry patrol. The Secretary of Agriculture praised the zeal and interest of the Air Service officers assigned to forest patrol duty.

Air Service Only 83 Per Cent of **Authorized Strength** 

Washington, D. C.—According to a statement prepared by the Statistics Branch of the General Staff, the present strength of the Air Service is but 83 per cent of the authorized strength. Under the provisions of the National Defense Act now in force, providing for a regular army of 278,000, the Air Service is allowed 11,300 men. New enlistments to

per cent of this number.

# Fourth Overseas Aerial Squadron Ready to Sail for Hawaii

Mineola, L. I.-Col. John L. Curry completed the inspection of the Fourth Overseas Aerial Squadron and left for Washington to make a report. It is understood that he will leave Washington shortly to take charge of aerial activities in Hawaii. The Fourth Overseas Aerial Squadron was recently organized for service in Hawaii and Col. Curry is said to be well pleased with the personnel of the outfit.

# Status of Planes and Engines

Washington, D. C .- The Air Service reports 9,586 planes and 32,033 engines of all types on hand; 54 per cent of the planes and 57 per cent of the engines are of the

Aeroplanes and engines are classified as "Active," "Obsolescent" and "Obsolete." Obsolescent types will be used until the supply is exhausted, but no extensive repairs are to be made or additional spare parts manufactured. Obsolete types are those no longer used. They will be held until final disposal has been authorized.

# October 21 have supplied but 9,372 or 83 Maynard Tests Plane for One-Stop Transcontinental Flight

Mineola, L. I.-Lieut. Belvin N. Maynard tested the modified DH-4 biplane Greyhound on November 17, for the attempt to fly from Mineola to Dallas to San Diego. The test was made with the full load of 300 gallons of gasoline, pilot and mechanic as required to complete the 1,600-mile non-stop flight, making a total weight of 5,000 pounds. This heavy weight caused an excessive strain and Maynard decided to avoid disaster be remaining in the air until fuel consumption should lessen his load. He therefore flew at full speed for three hours, consuming 90 gallons, reducing his load by 450 pounds and then made a successful landing.

In order to carry the load necessary for a non-stop flight of 1,600 miles, the Greyhound has been constructed with extra heavy landing gear. To overcome this adheavy landing gear. To overcome this additional weight, a small plane was built in between the landing wheels to support the landing gear while in the air. In addition to the main gasoline tank which carries 193 gallons, extra saddle tanks were built onto the side of the fuselage.

	T.,		LANES		7	cent	
CLASS	In com- mission	In re- serve	Out of commission	Total		In reserve	Out com.
Active	3	4,091 2,057 677 242	739 266 699 283	5,167 2,500 1,379 540	7 7 3	79 82 49 45	14 11 51 52
Total	532	7,067	1,987	9,586	5	74	21
		E	NGINES				
	In com-	In re-	Out of			r_cent	
CLASS	mission	serve	commission	Total	In com.	In reserve	Out com.
Active	414	15,833	2,100	18,347	2	86	12
Obsolescent		6,481	1,244	7,839	2	82	16
Obsolete		353	2,400	2,754		13	87
Experimental		1,562	1,509	3,079		51	49
School		14		14	• •	100	
Total	537	24,243	7,253	32,033	2	75	23



The Hanriot-Dupont biplane, equipped with 260 Salmson engine. It is very maneuverable and the French planned to concentrate largely on this two seater for the spring of 1919



# FOREIGN **NEWS**



# French Paris to Australia Flier Reaches India

Paris.—Etienne Poulet, the French aviator flying from Paris to Australia, has reached Karachi, India, according to messages received here on November 19.

Poulet now has completed nearly 4,000 miles of his journey.

Karachi is an important seaport in the Province of Sind, about 550 miles northwest of Bombay.

52,000 Passengers Carried in England
London.—The report of the Department of Civil Aviation on November 17 shows that 21,000 flights were made and 52,000 passengers carried with only 13 accidents since the official opening of the service in Great Britain last May.

A fast mail service between London, Paris, Brussels and Amsterdam is expected shortly.

# Antartic Expedition to Map Polar Region by Air

Antartic Expedition to Map Polar Region by Air

London.—To map the whole of the Antarctic from the air is the intention of Mr. John L. Cope, leader and organizer of the British Imperial Antarctic Expedition.

Members of the expedition not only intend to use the aeroplane to fly to the South Pole, but for the whole six or seven years they will be on the ice.

Aeroplanes of special design capable of carrying four men with provisions for at least one month will be used.

While a fast machine would be of great use, what will be more important is climbing ability.

Among the personnel of the expedition is Ernest Joyce, who accompanied the first Scott expedition to the South Pole, and was a member of both Shackleton expeditions. He will serve as second in command to Mr. Cope.

## 170 Miles an Hour Claimed by Italian Plane

Paris.—A new speed record for an aeroplane is claimed for an Italian aviator in a despatch from Rome. The message says an Italian machine, piloted by an Italian, flew 274 kilometres (about 170 miles) in one hour at the aviation field of Montecchio, on November 20. The name of the aviator was not given.

# Kosciusko Squadron Begins Active Operations

Lemberg.—The Kosciusko Squadron, composed of American aviators serving in the Polish army, has begun active operations against the Bolsheviki.

Patrols over the Bolshevik lines have been made by Major Cedric E. Fauntleroy, formerly of the Lafayette Escadrille and American air service, who commands the squadron, and by Captain Cooper, of Jacksonville, Fla.; Captain Cersi, of Brooklyn, and Lieutenant Graves, of Boston.

# Promotions Board for Royal Air Force Appointed

London.—The Air Ministry announces that a Selection Board has been formed in order to advise the Air Council as to the award of promotions to post-war R.A.F. officers, and to decide the procedure to be followed in future for the periodical selection of officers for promotion. The following are the members of the first board: Air Marshal Sir II. M. Trenchard, Bart., K.C.B., D.S.O.; Rear Admiral C. F. Lambert; Air Vice-Marshal Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O.; Air Vice-Marshal A. V. Vyvyan, C.B., D.S.O.; Secretary-Squadron Leader H. L. Jackson.

# Rome-South America Flight Planned for New Italian Dirigible

Rome.—Celestine Usuelli, a pioneer of Italian aviation, announces the design of a new dirigible 380 yards long and 80 yards wide, to be powered by six 500 horsepower engines to be used in a flight from Rome to South America.

The dirigible, it is claimed by Signor Usuelli, is capable of transporting a weight of twenty tons and can attain a speed of 45 miles an hour with one motor, 52 miles an hour with two motors, and 72 miles an hour with all six motors working. Using one motor alone, it is said, the dirigible can navigate for six days and cover more than 5,000 miles.

# Landing Places for Haiti

Gonaives.—According to information received from the local press, a landing field has been established at Gonaives, and others will be established at St. Michel and Mirebalais.

French Aviators Make 1,200 Mile Non-Stop Flight
Tunis, (French Wireless Service).—Two military aviators, Lieutenant
Patanchan and Major Cheutin, have arrived at Tunis by aeroplane
from Rabat, Morocco, according to a dispatch of November 15. The
flight, which is stated to have been made without a stop, covered a
distance of more than 1,200 miles.

India Urges Formation of Aerial Mail Company
Silma, India (Correspondence of the Associated Press).—The Indian
government is advocating the formation of a big company to have a
monopoly of carrying mail by aeroplanes. Establishment of aerodromes
at Calcutta, Bombay, Karachi, Nagpur, Madras, Rangoon, Singapore
and Delhi has been sanctioned.

D'Annunzio's Rome-Tokyo Flight Plans Unchanged Rome.—It is asserted in aviation circles that D'Annunzio intends to take part in the coming attempt to fly from Rome to Tokyo. The start of the flight is scheduled to take place between November 23 and the end of the year.

France Inaugurates Cross Channel Postal Service
Paris,—The first French aerial postal service began November 10 with the departure of the mail for England from Bourget, near Paris, and from Hounslow, near London, for Bourget. Commercial service has been in operation for some time, trips being made in two hours and fifteen minutes.

The fee of 2s. 6d. over the normal rate of postage, in view of the service rendered, is extremely cheap. It will be possible to hand in a letter at the G.P.O. up to 11 a. m. and have it delivered in Paris by about 4 p. m., in time for its recipient to take any action well before the close of the same business day. The time-table will be the same from the Paris side.

An air mail letter could also be transferred at Paris to mail trains for Rome, Madrid, and other Continental cities. To some countries this would mean an acceleration of mails by as much as 48 hours, a tremendous consideration where important business is concerned.

Johannesburg-Pretoria Service in Regular Operation
Cape Town, South Africa.—Under the leadership of Colonel Armes
and Major Miller, both late of the R.A.F., a syndicate for the development of commercial aeronautics has been formed.
Three machines have already been landed at Cape Town, and three
more are expected before Christmas, and, to begin with, an attempt
will be made to run a regular service between Johannesburg and Pretoria. The service was to be in full swing by October 1, and a landing
place has been selected at Pretoria, close to Roberts Heights.

Aeroplane Transport Foils British Railway Strike
London—Americans are getting out of Britain to the best of their
ability. Miss Humphrey and Mr. Williams, of New York City, flew
by aeroplane to Paris in order to catch the Rochambeau for America.

Northern Aerial Syndicate Plans Liverpool-New York Service
London—Plans for an aerial passenger service which will exceed
even the visions of a Verne are being made by the Northern Aerial
Syndicate of Great Britain, according to a recent report to the Department of Commerce from Trade Commissioner Henry F. Grady, in

Syndicate of Great Britain, ment of Commerce from Trade Commissioner Benry 1. London.

Mr. Grady's report says the syndicate is said to be arranging an airship service to New York, the plans providing for craft that will carry 150 passengers in addition to staffs of cooks, stewards, and crew. At Liverpool, passengers from America will be transferred to smaller aircraft and taken to their destinations. Moorings for the large ships, according to the plans, will be provided at leading hotels. The program also provides for a service from England to Perth, Australia, seven days being allowed in the calculations for the trip.

Rome—The aerodrome at Ciampino, near Rome, is busy building a new dirigible destined to cross the Atlantic Ocean. The airship, it is said, will be capable of traveling 3,125 miles without refueling. The frame of the ship comprises a hollow steel beam extending from the prow to the stern. This beam, according to the description, will take the place of the usual passenger carriage, and will be able to accommodate 150 passengers.

# General Seely Resigns as R. A. F. Head

General Seely Resigns as R. A. F. Head

London.—Major-General John E. B. Seely resigned as chief of the Royal Air Force on November 11 and took his seat on the opposition bench of the House of Commons on the following day.

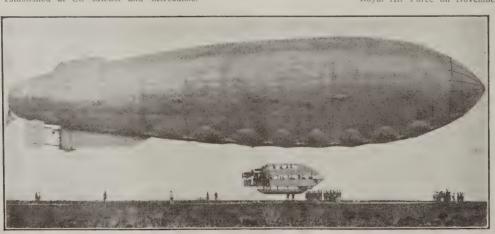
General Seely explained that he had resigned his post because of dissatisfaction over the dual control of the Air Force and the waste and inefficiency it involves. No personal difference has arisen which caused the resignation, General Seely stated to the press.

London Church Has Window in Honor of Airmen's Patron Saint

London.—The church in Spanish place, which King Alfonso attended during his visit to London, has recently received a new window in honor of St. Michael, the patron saint of airmen. It shows an aeroplane with the inscription, "Defende Nos in Proelio." It is said to be the first window in which a flying machine has been a feature of a church design.

R-80 to Be Completed

London.—The British dirigible R-80, work on which was stopped owing to the curtailment of the airship program, is to be resumed. The great airship is 95 per cent complete.



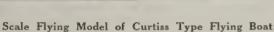
An Italian Military Dirigible of the "M" type converted into a passenger carrier and operated by the Government for public use



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. M-Mahon numumo 🖚 🔀 🗢 jamanumi



In the past only land machines, with few exceptions, have been shown on this page. These have their good points, but if this subject is to be studied intensively, any and all types must be taken into consideration. On this page a modified

Curtiss with some improvements will be found.

Close study of the accompanying drawing will show the student how well balanced this model appears to be, and although the long motor sticks extend some distance to the rear, they do not look out of place or clumsy. A model of this kind is well worth the trouble and expense incurred in the building, for it is not only a flying model, but a scale model as well.

When planning a flying boat model, the builder must bear in mind that as the center of gravity must come near the front of the model, the center of thrust must be high and the center of resistance low. The frictional resistance caused by the boat body skimming over the water must be taken into account. The model will have a tendency to nose over, so to guard against this it is necessary to turn the flippers up a trifle to keep the tail down and the model righted. Take care not to have the flippers turned up too much as this might cause the model to lift too quickly and turn over. The correct angle at which the flaps should be placed can be determined by experiments.

When building the model, it would be advisable to construct the body of Balsa wood coated with shellac or Spar Varnish. In order to get the minimum weight, the body should be shaped as shown, the measurements of which may be determined by use of the accompanying scale. After shaping, the body should be sawed into halves, these gouged out to lighten, and then glued together again. This will make an exceedingly light and well shaped body.

The body can be built much the same as any ordinary fuselage, covered with silk or paper, and then varnished. This, however, necessitates much work, for it is more difficult to make to the proper shape.

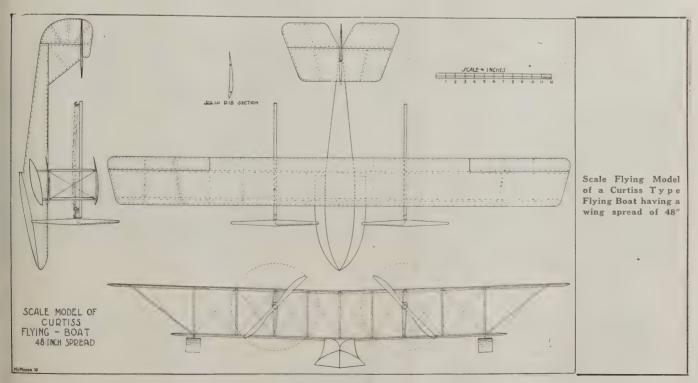
The Balsa wood boat body is the better method. Balsa wood can be purchased from the Wading River Mfg. Company from which company the complete drawings of this flying boat can be obtained.

After the boat is shaped, it should be shellaced with a thick After the boat is shaped, it should be shellaced with a thick coat. When dry, rub down with a fine grade of sandpaper, varnish again, and this should be repeated if necessary, if the skin is not watertight. Solid ribs are used in building the wings. The ribs are 1/32" thick, cut to the shape shown and holes are then drilled for the spars. The spars are 3/16" Dowel sticks inserted in the holes in the ribs. When in place, drop a little glue on each side to hold the ribs in place, The ½" reed edging is next attached to the ends of the ribs and spars, held together with glue and nails and the covering then fastened. Silk, rather than paper, is advisable for it is stronger, especially after a ducking (which flying boats get sooner or later). The covering is then doped and varnished, similar to the body. nished, similar to the body.

The tail surfaces are built up also. The edging is 1/8" reed, the cross braces 1/8" square. These should be keep as light as possible, and if the builder feels that the material he is using is too heavy, it should be made smaller in cross section, or split bamboo should be used, the joints being bound with thread and glue.

To assemble the model, place the bottom wing on the boat body and fasten in place. Drill holes in the spars for interplane struts and glue in place, or purchase small sockets which are made expressly for this purpose, and insert the struts. The top wing is then placed on top and cross wire braced to hold it rigid. The tail surfaces should be nailed or wired on and reinforced with ambroid or any other water-proof glue. The motor sticks are the ordinary kind and

or wired on and reinforced with ambroid or any other water-proof glue. The motor sticks are the ordinary kind, and should be slipped through the double struts which are parted to allow the stick to pass through and fastened after the model is balanced. To balance, move the propellers and mo-tor sticks to the rear or vice versa. The model must be balanced well before attempting to fly from the water. The elevators must be tilted up a trifle during the first few flights until balanced. This will keep the model from nosing over.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

# In a Manner of Speaking

Lieutenant W. B. Maynard, the "flying parson" in the aerial derby, is, of course, what is known in ecclesiastical circles as a high church man.

But, as a Baptist, ought he not use a seaplane?—N. Y.

# Wanted to Know

Pa? Yes, my son.

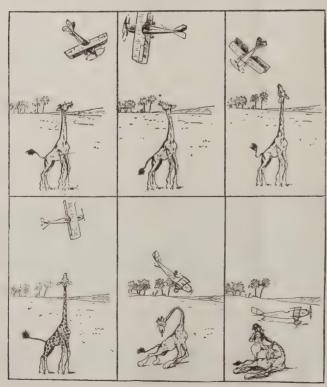
Are an army's right and left wings what it flies with?

"Dropped a sledge-hammer on your toe and you cry like a kid," said the airman to his little son. "Why don't you act

"Because you'd gim-me a lickin', like you s-said y-you would i-if you ever h-heard me usin' that k-kind of l-language."

The famous speech at the tomb of Lafayette attributed to General Pershing and others is still in the minds of Americans. Last week a crowd of homesick doughboys visited the same spot. After a moment of silent awe, one spoke up: "My God, Lafayette, we're still here."—American Legion Weeklv.

Lookout—"Object floating at fifty degrees, sir."
O. O. D.—"Can you make it out?"
Lookout—"Looks like an iron ladder, sir.—The Log.



A humane method of killing giraffes by aeroplane, according to a
German Cartoonist in "Luftpost"

# The Ghostly Fliers

(In memory of the American aviators who died in the Great War.)

Sweep clear the skyey avenues of morn! No cringing clouds forlorn,
(Ye hastening heralds of Earth's exulting spheres.)
Let loiter now as baleful barriers
Against the mighty pageant of the Sun—
The Kingly One—
Who leads today these swift-winged charioteers,

Brimmed high with brave exuberance of youth-Symbols, afire, of Chivalry and Truth-At dawn, in one last grand review and flight, Innumerable shafts of living light
Let fall across the Marne's immortal vale,
Let thunderous clamor rise before the sight—
All hail to them! All hail!

For these are ghosts of Yankees overbold—
The Fearless Fliers—who battled not for gold,
But that the cause of Freedom might not die.
These said Good-bye,
And, harkening to Duty's clarion call,
Upon Fair France's altar laid their all.

And so, while Autumn's face smiles down the hills, And Victory's refreshing breath distills A dream of old-time beauty for men's souls, See, now, the Sun's gold vista swift uprolls! Lo, Autumn's song is leaping on the breeze! Let no hearts mourn through bitter memories, For these were gallant knights who skimmed the ways Of flowered-bordered triumph; crowned with bays, They went to sleep in Youth's flood-tide of days!

Rise up, ye happy-throated larks a-wing! Make now a merry music, ravishing, For these artificers of towering dreams,

Who plumbed Uranian streams. Yes, crystallized with diamond-shotted fire, For them the peak of Morning's blinding spire Shall flame with living rubies, like the Sea When sunset rests upon it lovingly. Let all the Universe greet them with song! With dauntless raptures, strong Earth sends a Jubilate to the sky,

Blue-vestitured and high, For these untrammeled lutanists of life, Who gloried so luxuriously in strife. Unfold, unfold, ye blossoms of the dawn! Make bright the path their eyes now look upon. With royal pomp let Morning's halls be spread,

Imperishably red-They are not dead!

Nay, troops of Time's proud heroes flaunt each name-Lufbery, Chapman, Roosevelt, they acclaim, Of that young, shining company who came To keep alive fair Freedom's sacred flame. Look ye aloft, where Love has kissed their eyes-Comrades in Paradise!

J. Corson Miller, in New York Times.





Above the Clouds in the Handley-Page Biplane

General Board Asks \$42,000,000 for Naval Aircraft

HED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY

# "Round the Rim"

Over 9,823 Miles

ON THE ORIGINAL 48

# **B-G SPARK PLUGS**

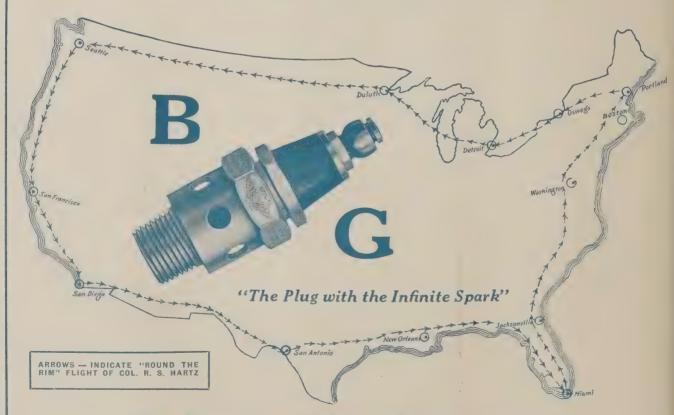
NOT ONE OF WHICH WAS REMOVED FROM THE MOTORS DURING THE ENTIRE TRIP, FROM JULY 24th TO NOVEMBER 13, 1919

By Col. R. S. Hartz

"The spark plugs were B-G plugs. They were tested for 30 minutes in a DH prior to the flight. While on the flight they had 24 hours and 25 minutes warming time and approximately 114 hours and 45 minutes flying time, total of 140 hours, which brings the cost for plugs per hour to \$.0214.

"It might be well to call attention again to the fact that these plugs were outdoors with the exception of two nights, from July 24th to November 9th in a storm, the duration of which was over two hours, and stood out for 31 days before the flight was resumed, in practically all possible climatic changes in the United States for this season of the year and not once during the entire flight was there a spark plug miss. After standing out for 31 days in all kinds of weather it was found that the first time the left motor was cranked it took and the second time the right motor was cranked it also took. During the entire flight whenever it was hard to start the motors we found it was gasoline and not motor ignition trouble that caused it. The longest sustained flight made during the trip was, from ground to ground, 7 hours and 20 minutes."

(From Official News Bulletin, Department of Military Aeronautics)



The Brewster-Goldsmith Corporation 33 Gold St., New York City, U.S.A.

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### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., December 8-15, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, DECEMBER 8-15, 1919

No. 9

### GENERAL BOARD ASKS \$42,000,000 FOR NAVAL **AIRCRAFT**

THE General Board in its report to the Secretary of the Navy covering the fiscal year 1921 has recommended that "adequate support" be given to aircraft development and asks for the following appropriations:—"Heavier than air craft, \$11,000,000; lighter than air craft, \$10,000,000; experimental construction, \$20,000,000.

"This does not include what is necessary for the second s

"This does not include what is necessary for the maintenance of the existing air fleet," adds the report.

Secretary Daniel's Annual Report

Secretary Daniel's Annual Report
Secretary Daniels, in his annual report, discusses the aircraft situation, and the naval achievements of the past year, at considerable length. The following are some excerpts:
That dream of aviators, flight across the Atlantic, has at last been achieved, a United States Navy seaplane being the first craft to make the voyage through the air from America to Europe. On May 26, 1919, a huge flying boat swung into view of thousands of watchers who lined the shore at Lisbon, Portugal, and, circling over the harbor, descended to its mooring. It was the NC-4, Lieut. Commander Albert C. Read commanding, and its arrival there marked the accomplishment of the first trans-Atlantic flight. Royally received plishment of the first trans-Atlantic flight. Royally received by the Portuguese authorities and people, the NC-4, after three days in Lisbon, left for England, arriving May 31 at Plymouth, the port from which the Pilgrims sailed for America 300 years ago. Completing the voyage of 4,500 miles, Lieut. Commander Read and his crew were given a welcome worthy of pioneers who had led the way in trans-ocean navigation of the air. gation of the air.

### Airship of Largest Type Purchased By the Navy

The importance of bringing our own lighter-than-air craft up to the high state of development reached in England and Germany is thoroughly realized by all who are interested in aeronautics, and we are making every effort to that end. None of the modern rigid-type airships having been built in this country, we have succeeded in purchasing from the British Government one of the largest type, similar to, but larger than the R-34, which will soon be brought to America.

The same legislation which authorized the purchase of this airship abroad also made appropriation for the construction in this country of an airship of the largest type, which will be

built as rapidly as possible.

Building Huge Hangar at Lakehurst, N. J.

To accommodate this airship and others to be built, we are erecting at Lakehurst, N. J., a hangar of unprecedented size, for both construction and storage purposes. Plans and specifications were prepared and contracts awarded by September 8 for a building 804 feet long, 318 feet wide, and 200 feet high, with a frame of structural steel built on the three highest arch trues principle, each arch supported on steel hinged arch truss principle, each arch supported on steel towers 62 feet high.

towers 62 feet high.

The entrance door is double, consisting of two leaves, each 177 feet high and 136 feet wide, framed in structural steel and braced to a thickness of 76 feet at the bottom. Special railway track is provided as a runway for these immense portals. When fully opened, their upper contour forms an unbroken arch outline with the roof of the building, and the whole arrangement provides a windbreak nearly 600 feet wide, insuring a large degree of safety in landing and releas-

ing the ships. The magnitude of these doors can be better grasped when it is stated that a 12-story building with a front-age of 135 feet could be placed within the hangar through the space covered by either leaf, with clearance to spare all around.

### Will Accommodate Airships Larger Than Any Now Built

The body of the structure will accommodate two dirigibles of 5,000,000 cubic feet capacity, each more than twice as large as the celebrated R-34, or one dirigible of 10,000,000 cubic feet capacity. Overhead trolleys are provided for the construction of airships, and three docking rails of special design for landing, releasing, and mooring purposes extend throughout the length of the building and for 1,500 feet in front. The two standard-gauge railway tracks occupy similar spaces. hangar is expected to be in service by next summer.

### Helium Production Plant Erected in Texas

large helium plant has been erected at Fort Worth, Tex., and this is of vital importance in lighter-than-air craft, as the exploitation of helium as a flotation agent for dirigible balloons has been a most interesting war development. gas, formerly very rare and expensive, is nearly as buoyant as hydrogen and less combustible than asbestos. It is the one unique balloon-filler known. Fortunately, it exists in workable quantities in the natural gases of north Texas.

The helium plant is, as the name suggests, for the production of helium commercially. The work will cost, when completed, approximately \$5,000,000. The plant takes the natural gas, from which helium is extracted, through a pipe line 96 miles in length. The production of 40,000 to 45,000 cubic feet per day is contemplated.

per day is contemplated. This output is to be distributed to the various air stations in steel cylinders, each having a capacity of 180 cubic feet of free gas. Such a capacity is thought to be sufficient to furnish supplies of helium to our entire dirigible fleet as needed. A study is now being made of an additional stage in the refining plant to repurify used helium after diffusion. has occurred in use, which should result in a very desirable

### "C-5" Made Flight from Montauk to St. John's

While the NC planes were at Trepassy last May, the dirigible C-5 Lieut. Commander Emory W. Coil commanding, established a world's record for a non-stop flight for airships of the non-rigid class, flying from the naval air station, Montauk, Long Island, to St. John's, Newfoundland, a distance of 1,050 nautical miles, in 25 hours and 50 minutes. Soon after she arrived a heavy gale sprang up suddenly, and, despite all efforts made to hold her or deflate the bag, the big balloon was torn from its moorings and swept out to sea. Destroyers and other vessels searched the area for days, but no trace of the missing dirigible was found. The trip to St. John's and previous tests indicated that the C-5 could successfully have negotiated the trans-Atlantic voyage.

### Radio Transmitted By Seaplane 1,400 Miles

Radio transmission in aircraft was greatly improved during the period of hostilities. On the trans-Atlantic flight two-way communication was maintained with a shore station over a distance of 700 miles. One seaplane was heard at the Bar Harbor, Me., receiving station from a distance of 1,400

### New Navigational Instruments and Methods

A number of the new navigational instruments, recently invented or developed, were used for the first time in the trans-Atlantic flight. These include an aerial sextant, by which the aviator can calculate his position by or star observation; a draft and speed indicator by which, sighting on flame and smoke bombs dropped into the water, the velocity and direction of the wind may be determined; and a course-and-distance indicator.

### Naval Aviation an Integral Part of the Service

This emphasizes the necessity of developing aviation as an integral part of our military and naval forces. When an airship can fly from Europe to America in a few hours, the ocean is no longer a dependable protection against possible attack. Civilian aviation should be given every possible encouragement, but naval aviation, to be effective, must be moulded into the naval service, of which it is a vital part. For this, special training is required, not only in methods of fighting and patrol, but also in naval training to insure that complete understanding between all parts of the force employed, that mutual knowledge which is a prime requisite in all military operations. Our aviation force must be made a part of the fleet as well as an effective coast patrol—capable not only of operating from shore, but also at sea, accompanying our ships wherever they may go.

### Objections to Creating Separate Air Service

Favoring every encouragement that can be given to aviation in all phases of development and activity, I am convinced that the creation of a united air service, as a separate department of the Government, is unwise. Certainly the Navy, and believe the Army, considers it essential to military effectiveness to retain its own aviation corps and stations. Military aviation, which has for its purpose fighting effectiveness, necesitates military training, and this differs materially in the two services. Not only does naval aviation require different types of aircraft from land aeronautics, but a different kind of training, to fit flyers for fleet operations and coast and sea patrol. Ability to fly a machine is merely the first step; pilots must be trained to cooperate with vessels, to escort convoys, to hunt submarines, and engage enemy vessels as well as aircraft.

### Special Training and Close Cooperation Essential

Between separate services it is always difficult to secure the close cooperation that is required in military operations. By retaining aviation as a part of the Navy and Army, jealousies and clashes over command, almost inevitable where they have to depend on a separate service, are avoided. Each provides the training for its needs, and keeps in operation an organi-zation, standardized in methods and equipment, which, in time of war merely needs to be expanded, absorbing the new personnel into a membership already indoctrinated and familiar with purposes and operations

### Officers Can Alternate in Flying and Line Duties

Another important point is that officers can, to some degree, alternate in duties of the regular line and those of aviation, thus familiarizing them with the Air Service, and insuring a constant exchange of ideas, a better understanding and warmer sympathy, and a higher degree of cooperation be-

tween the two branches of the service.

By retaining aviation as a part of the Army and Navy, places can be provided for the flying personnel, who can pass back into the line when their flying usefulness becomes diminished. This could hardly be done by an independent service, which would, in time, at a considerable expense to the Government, result in a large class of specialist officers available only for particular duties on the ground, and for whom there would be no really important activity. Efficiency, economy and effectiveness all appear to demand that naval aviation be conducted by the Navy. aviation be conducted by the Navy.

### Joint Army and Navy Board on Aeronautics

A joint Army and Navy board has been created to bring about closer co-operation between the two services and consider all phases of the aviation activities of Army and Navy. This board is composed of:

This board is composed of:
Army members.—Maj. Gen. Charles T. Menoher, U. S. Army, chairman; Lieut. Col. Byron Q. Jones, A. S.; Lieut. Col. George A. Nugent, C. A. C.; Lieut. Col. Shepler W. Fitzgerald, A. S.; Capt. A. J. Clayton, A. S., secretary. Navy members.—Capt. Thomas T. Craven, U. S. Navy; Capt. Lyman A. Cotten, U. S. Navy; Commander J. C. Hunsaker, U. S. Navy; Commander Warren G. Child, U. S. Navy.

Two Services Brought Into Closer Touch

This board is to make recommendations for coordination of the aeronautic work of Army and Navy, in production, training, operation, selection of aviation bases and sites, purchase of material abroad, etc., and also for coordination with the aviation activities of other branches of the Government and also consider the coordination with the aviation activities of other branches of the Government activities are considered to the coordination of the coordination activities of other branches of the coordination activities of other branches of the coordination activities are considered to the coordination of the coordination activities of other branches of the coordination activities are considered to the coordination of the aeronautic work of Army and Navy, in production, training, operation, selection of aviation bases and sites, purchase of material abroad, etc., and also for coordination with the aviation activities of other branches of the Government of the coordination of the coordination activities of the coordination of the coordination of the coordination activities of the coordination ment and civil organizations. A great deal has been done toward bringing the two services in closer touch, acquainting each with the activities of the other, preventing duplication of work and installation, and utilizing, wherever possible, the facilities existing or to be established, to whichever services the states. ice these may belong.

### Reserve of 4,000 Trained Officers and 20,000 Men

As a result of war activities, naval aviation is now supplied with a Reserve Flying Corps comprising approximately 4,000 officers and 20,000 men, of which more than 2,500 of the officers are qualified naval aviators and 1,500 are aviation technists and administrators. The enlisted personnel of the Reserve Corps has been trained for aviation duties and as a contraction of the contraction of Reserve Corps has been trained for aviation duties, and, as a class, are believed to be as expert aircraft mechanics as the present state of the science can develop.

### Aircraft Operations with the Fleet

Relieved of the pressure of war, it has been possible to give further consideration to the broad devlopment of naval aviation as an auxiliary to fleet operation, and a fleet air detachment was assigned to the United States Atlantic Fleet, during the maneuvers at Guantanamo, consisting of six twin-motored flying boats, three single-seater scout airplanes, and a division of kite balloons, with the U. S. S. Shawmut as mother ship.

### Used in Search, Bombing Practice, and Spotting

The detachment served with considerable success. The flying boats were used for search problems, bombing practice, and spotting. Spotting for the fleet was also done by land-type machines with marked success. Kite balloons were used from batleships. Certain of the battleships have also have availed with flying machines musted upon the clips. been supplied with flying machines mounted upon the ships' turrets, from which they are launched.

(To be continued)

### SECRETARY BAKER DISCUSSES INDEPENDENT AIR SERVICE IN ANNUAL REPORT

(Continued from last week) In this war the aeroplane was primarily valuable for observation purposes. The old war of movement gave place to a war of positions by reason of the vast forces engaged and concentrated upon a relatively short frontier. The cavalry arm had little opportunity to perform the function usually allotted to it; knowledge of enemy movement of troops for the purpose of massing and supplying them at concentration points for attack was therefore largely secured through aerial observation from balloons and aeroplanes. Photographing the enemy lines and territory back of them was also an important source of information. Each side sought to gain as much information in this manner as possible, and to gam as much information in this mainter as possible, and to prevent enemy observation by anti-aircraft gunfire and by fighting aeroplanes armed with incendiary ammunition which burned up the gas bags of balloons or by gunfire drove off or 'destroyed enemy aeroplanes. In addition to this, aeroplanes undertook extensive bombing operations for the purpose of destroying railroad centers, ammunition dumps, and footening and dispersions much drove back to of the approximation of the specific processing masses at recomb back of the specific processing masses and troops back to of the approximation of the specific processing masses and troops back to of the approximation of the specific processing masses and troops back to the specific processing the specific process and the specific process are specific process. factories, and dispersing massed troops back of course, lines. Their effectiveness in these operations was, of course,

diminished as they were forced to operate at higher and higher altitudes by the development of anti-aircraft artillery, and increased from time to time as scientific instruments lent greater precision to bomb dropping. In addition to these operations, aeroplanes were indispensable in the control of artillery fire and were frequently used to harass and delay marching infantry columns by low altitude flying and machine gun fire.

How far the aeroplane by being armored to resist shrapnel, or by the perfection of its scientific instruments can be developed so that its bombing operations will obtain more serviceable certainty, can not be foretold; but it is interesting to note that although the Germans developed the bomb-droping machine and used it extensively, the direct damage inflicted was relatively small. In the American Army, out of 222,252 casualties admitted to hospital as a result of battle injuries, only 141 were ocasioned by aeroplane bombs. These figures must not be taken to indicate that air bombing is not an important military operation, although they do seem to show that if the aerial bombardment of back areas and inland cities be excluded, as it should plainly be excluded upon (Continued on page 342)



### THE NEWS OF THE WEEK



### Aerial Touring Association Plans Week-End and Vacation Tours

New York, N. Y.—Aeroplane tours from the United States to Cuba, to Latin American countries, and eventually across the Atlantic, are features of a program announced by the Aerial Touring Association, of which Major Charles J. Glidden, founder of the Glidden automobile tours, is President. The association has opened offices in Washington, New York, Atlantic City and Havana.

It is planned to conduct weekly tours throughout the year, and to extend them to the South as the cold weather approaches. One object of the association is to create a market for surplus army and navy aeroplanes and aeronautic material. At the start the tours will be made with "economical" type of planes, equipped with ninety-horsepower motors, of which the Government has thousands for sale. When it becomes feasible the association proposes to use larger and more powerful planes equipped with higher power engines.

Seaplane tours are to be begun as soon as possible and at the outset the tours will be divided into four classes. There will be one-day tours and there will be week-end tours that will last from Friday until Sunday or Monday. The third class will be the "Vacation Week" tours in which the aerial tourist will be able to spend his or her week flying from place to place. The fourth class will be the 3,000-mile tour, which will last ten days. It is intended to make a day's journey

It is intended to make a day's journey 250 miles, which will mean less than four hours in the air, so the traveler will have time enough on the land to play golf, see sights or go swimming, motoring or indulge in other diversions. Mechanics, spare parts and fuel will be supplied at designated stopping places.

The starting point of the various tours will be the newly established air port at Atlantic City. The tours embrace the territory between New York and Cleveland and as far north as Albany. The 2,500-mile trip will take in Cleveland, Chicago, St. Louis, Indianapolis, and a dozen other cities. The 3,000-mile tour, which will last about fifteen days, will cover the same routes, but it will be extended further south, visiting many of the Southern States. Seaplane cruisers and Canadian tours are being considered, as are Pan American trips.

### Aero Club of America Homologates Schroeder's Record

New York, N. Y.—The Aero Club of America has homologated Major R. M. Schroeder's two-man altitude record of 31.800 feet.

In referring to this flight, which was made at Dayton, Ohio, Major Schroeder said:

"This record climb was made with a passenger and no unusual experiences were encountered. Our oxygen worked fine and would have lasted for two hours longer. I had another hour and a half of gasolene and would have reached about 36,000 feet, but was forced to quit on account of a broken water line. I came all the way down with a dead engine and landed in our field.

"My next attempt will be in a week or so. This time I will go all by myself, which means I can get about 40,000 feet because I will be able to reduce my load 200 pounds. I am using a Le Pere with a supercharged Liberty and it is working just wonderfully. I expect to make some remarkable flights this coming year."

remarkable flights this coming year."

The present altitude record for one man, held by Roland Rohlfs, Curtiss test pilot, is 34,610 feet.

### Raymond Hitchcock Makes First Flight in Curtiss Seagull

Atlantic City, N. J.—Raymond Hitchcock, the actor, took his first aeroplane ride in Earle Ovington's Curtiss seagull recently. As a result he has become a real aviation enthusiast and now opens his show with a description of his flight. Speaking of its safety, he says: "Lying in a baby-carriage sucking your thumb, or sitting in a rocking-chair with your felt slippers before the fire, are dangerous pursuits compared to riding in a modern aeroplane."

### To Duck Hunt by Aeroplane

Spokane, Wash.—By using an aeroplane, two progressive Spokane men flew seventy-five miles to Odessa Lake and return and got a bag full of ducks within a day. The return trip was made in fifty-five minutes. They were O. W. Wetzel, head of the Wetzel Jewelry Company, and T. W. Symonds, of the Russell-Symonds Aircraft Company.

### Decoration Scheme for Chicago Aeronautic Show

Chicago.—The decorative scheme for the Chicago Aeronautical Show to be held January 8th to 15th was announced to-day. Charles R. Hall, said to be one of the leading decorators of the country, will have this work in charge. "The decorations for our show will be sensational," said Chairman George W. Browne yesterday. A blue canopy studded with hundreds of twinkling electric stars will form the sky effect, while on the walls of the Coliseum will be an immense panorama painting, showing scenes from the Alps to the Pyramids, with the ever present aeroplane and dirigible in flight. There will also be a gallery of giant paintings showing the famous NC-4 and the Vickers-Vimy in their trans-ocean flights. Filling the vast ceiling space will be aeroplanes with propellers in motion, circling around the giant dirigible which will form the center of the first Aeronautical Show given in the West. Underneath will be the 1920 models, ranging from the smallest single-seater to the multi-passenger limousine.

Additional exhibitors have availed themselves of the show to exhibit their latest planes. Vice-President Harry Newman, of the United Aircraft, Incorporated has reserved over five thousand feet of space, the second largest space in the Show. Major Reed Landis, of the Interallied Aircraft Association, will exhibit models of the British Avro, equipped with the foreign Le Rhone motor, with self-starter. Efforts are being made by the management to also have a representative government display, and without doubt the Chicago Show will prove a tremendous educational factor in aeronautics.

### Lawson Plans 100 Air Liners

Indianapolis.—In an interview here, Alfred W. Lawson, president of the Lawson Air Line Company, designer and pilot of the air liner which made the trip to the Atlantic seaboard and back, announced that he will construct one hundred aircraft similar to the original Lawson air liner. He is planning a thirty-six-hour service between New York and San Francisco.



The Breguet Commercial four passenger machine, in daily service in France

### Cattle Rustlers Detected by Aircraft

Washington, D. C .- A report received from the Mexican border describing the detection of cattle rustlers over the der line has pointed to a valuable field of der inne has pointed to a valuable held of utility for aircraft. A cavalry troop was sent in pursuit of a band of Mexicans which had made off with a number of horses and mules. The cavalry scouts did not succeed in establishing contact with the bandits, but an aeroplane acting independently legical them in the properties. independently located them in a mountain corral. The aviator attempted to signal the cavalry, but being a new unit, did not make out his directions. But borrowing a horse in back of the line he caught up with the chasing cavalry unit and informed them of the location of the corral. Returning to this by aeroplane, the aviator found the bandits, warned of the pursuit by the reconnaissance of the aero-plane, were dispersing the horses and in hiding. At present an airship is being installed at El Paso with a view to supplementing aeroplane observers with airship There are so few good landobservers. ing fields in the desert on account of the sand and small bushes that the use of the aeroplane over some large stretches of territory can only be effected at very high altitudes. At night it is expected the airship will be able to shut off its power while using microphones for listening. Upon hearing sounds which justify the measure they can drop illuminating flares. It will thus be seen that both night and day the lot of the bandit and cattle rustler is hard. Territory about 50 miles on each side of the border is badly denuded of live stock due to the fact that half-starved people take every possible opportunity to steal sheep, goats and cattle.

### Aerial Ambulance Assures Comfortable Travel

Richmond, Va.—Robert Bull, a resident of the eastern shore section, recently brought his wife to a hospital to be treated for spinal trouble in a seaplane.

After their return home at Melfa, Va., Mrs. Bull pronounced the plane the most comfortable means of traveling she ever

experienced.

The seaplane was at one time known as the A-5050, of the United States Navy. Bull has christened the craft "The Alhatross"

## Aeronautical Engineering Society Formed at Mass. Institute of Technology

Cambridge, Mass.—The Aeronautical Engineering Society organized at the Massachusetts Institute of Technology to foster interest in aeronautical engineering has already attained a membership of four hundred. The first trip of the society was made to the Curtiss Flying Field at Bedford, Mass., and the members of the society were taken for a fifteen minute flight. A lecture on superchargers will be given by Dr. S. A. Moss, of the General Electric Company, at the first smoker of the year.

### Aeroplane Thieves Caught By Baltimore Police

Charlottesville, Va.—The Curtiss aeroplane which has been here since Thanksgiving Eve, taking University of Virginia students on flights, was stolen from the hangar near the college athletic field on December 1 while its owners were at breakfast in a hotel.

In response to messages sent in every direction word came late in the evening of the capture of the ship and its pirate



Syd Chaplin discussing with Emery H. Rogers, the record-making trip from Los Angeles to San Francisco and return

crew by Baltimore police. Sheriff Thomas at once wired that the two men be held and that they would be sent for as soon as requisition papers could be obtained. Arriving on a late train the day before

Arriving on a late train the day before two men visited the flying field after dark and were on the ground by daylight next morning. Two hours later they took to the air and after several weird and spectacular evolutions ascended to a height of 5,000 feet and disappeared over Monticello Mountain.

The aeroplane had left New York two months ago and made stops in New Jersey, Delaware and Virginia towns.

### Flies to Chicago From Oklahoma

Chicago, Ill.—Miss Ann Lord, of Okmulgee, Oklahoma, recently flew from her home to Chicago, where she is taking up studies at the University of Chicago. Although she is probably the first of her sex to fly to college, she had never seen a railway train until she was sixteen years of age.

### Aeroplane Flight to Alaska

Washington, D. C.—The Training and Operations Group of the Air Service is investigating the feasability of aeroplane freight to Alaska. Valuable data has been received from J. W. Tyrrell, of Hamilton, Canada, a noted explorer who has travelled extensively in the sub-Arctics of Alaska. He states that the summer season would be unsuitable because suitable landing fields would be hidden by timber. On the other hand, the darkness and storms of the winter season are unsuited to experimental flying.

There is, however, at least one month in the year, which offers many favorable conditions to aviation, and that is the month of April. By the first of April the storms of the winter season have passed and the North country enjoys a condition of continuous daylight and by that time the weather has become comparatively mild, but the condition of the ice on the lakes and ponds is in an ideal condition to afford innumerable safe landing places. By that time the snow covering the ice has either greatly settled or entirely disappeared, leaving a hard even surface of ice upon the lakes, ponds

and rivers. The rivers, however, have a tendency to break up much earlier than the lakes, and besides at swift sections of the streams, the ice is often treacherous and unsafe even throughout the winter, and for these reasons the lakes would afford much safer landing places than the rivers, although with care they might also be made use of for such purposes.

### Speedy Aeroplane Film Delivery From Los Angeles to San Simeon

Los Angeles, Cal.—In order to entertain a large party of guests at his ranch at San Simeon, Mr. William R. Hearst, the newspaper publisher, called upon one of the large film exchanges here to deliver a number of films and an operator to his ranch at San Simeon, 250 miles from here. Transportation facilities being inadequate, the Syd. Chaplin Aircraft Corporation was called upon to effect the delivery.

The trip from Los Angeles was completed in three and a half hours, one stop being made at Santa Maria, California, as the pilot was not throughly familiar with the country over which he was traveling and wished to get information at this place.

The plane returned from San Simeon Sunday afternoon, bearing as passengers George Hearst, the eldest son of Wm. R. Hearst, and a boy companion. The return trip was completed in two hours and fifty-five minutes.

### Navy Selling Seaplanes and Flying Boats far Below Cost

Washington, D. C.—In order to promote and stimulate interest in civilian flying, the Secretary of the Navy has decided to offer for sale at very attractive prices, varying from one-tenth to one-third of cost price, much of the surplus stock of seaplanes and flying boats of many models, both large and small.

In addition to the seaplanes, spare parts and spare engines are being offered at ex-

ceptionally attractive prices.

The Navy in placing aeronautical equipment on open sale at attractive prices hopes to accomplish the two-fold purpose of developing aviators among the civilian population and of disposing of some of the seaplanes ordered during hostilities and not needed since the signing of the armistice and the curtailment of the Naval programme, thus releasing much needed storage space.

In the few weeks that this sale has been proceeding many aviators have taken advantage of the bargains offered, buying hundreds of thousands of dollars worth of this material. A catalogue is issued giving full description of the planes, engines and parts offered for sale, their present location, original cost and the price at which they are now offered. Prospective purchaser may of course inspect the material before buying. All material sold is prepared for shipment and loaded at the expense of the Navy. Most of the sales have been arranged by mail. The catalogue of seaplanes for sale will be sent upon request to the Bureau of Supplies and Accounts, Sales Section, Navy Department, Washington, D. C.

### Renew Lease on M. I. T. Wind Tunnel

Boston, Mass.—The Government has just renewed their lease of the Wind Tunnel at the Massachusetts Institute of Technology for another year and are now making experiments on a new model for a naval training plane.



### Aluminum Castings Reorganized

Cleveland, Ohio.—The Aluminum Castings Company has been reorganized under the name of Aluminum Manufactures, Inc., with the additional capital needed to extend and develop the manufacture and marketing of aluminum, brass and bronze products.

The new company, besides taking over and continuing to operate the plants of The Aluminum Castings Company, is planning to construct an aluminum forgung plant and other plants for making fin-

ing plant and other plants for making finished aluminum products, the latter being largely the development of the research laboratories of The Aluminum Castings

Company.

The management of the new company will be the same as that of The Aluminum Castings Company and with its increased facilities will be in better position than ever before to keep pace with the constantly increasing demands for the

various forms of aluminum products.

Pending the formal conveyance of the physical assets of The Aluminum Castings Company to the new company, the business will be conducted as heretofore, under the name of The Aluminum Castings Company.

### Week-End Journey by Aeroplane Saves Time

Los Angeles, Cal.—As a practical demonstration of the aeroplane as a means of conveyance for week-end journeys, E. H. Rogers, general manager for the Syd. Chaplin Aircraft Corporation, on Saturday, September 6th, flew in a Curtiss plane from Los Angeles to Del Monte to attend a Gold Tournament, being held at the Del Monte Hotel. Mr. Rogers carried with him as a passenger Victor H. Levy, a prominent business



S. W. Cogswell, veteran Curtiss pilot, now in charge of the Atlantic Coast Aero Station at Newport News

man and sportsman of Los Angeles. The trip was quickly and comfortably negotiated. After remaining in Del Monte Saturday and Sunday they flew to San Francisco, returning to Los Angeles on Monday.

### Handley Page Obtains Canadian Charter

Morrisburg, Ont.—The Handley Page, Ltd., have obtained a charter to do a general aeronautic manufacturing and operating business with a capitalization of \$2,500,000. The directors are William Harold and Vice-Admiral Mark Kerr, of London, Eng.; Harry Clark, of Montreal; Fred Chalmers and W. H. Gannon, of Morrisburg, where the executive offices will be located.

### Three-Passenger Farman Tested Here

Mineola, L. I.—A demonstration of a new three-passenger, pusher type of aeroplane developed for commercial exploitation by Henri and Maurice Farman, the French pioneers in aeronautics, was made on November 21 at Roosevelt Field, near Mineola, Long Island. A number of invited guests were taken up for short flights by Louis Gaubert, a French pilot who is credited with having brought down the second German plane in the war. Among those who took a flight was Lucien Coupet, who recently flew with eight passengers from Paris to Dakar, South Africa.

The placing of the propeller to the rear of the pilot and passengers increases the view of those in the plane and does away with the draft caused by the propeller. The plane has a maximum speed of 75 miles an hour. The motive power is obtained from a twelve-cylinder 130-horse-power Renault engine.

### Alabama Ready for Commercial Air Travel

Montgomery, Ala.—With a view to prospecting their territory, two representatives of the Johnson-Curtiss Company made a cross-country flight through the states of Alabama and Georgia in a Curtiss JN-4 plane. Good landing fields were found at Americus, Macon, Augusta, Savannah and McRae. Other towns were very anxious to secure the establishment of municipal landing fields, and it is believed that it is only a question of a short time before numerous fields will be available.



The British aerial transport two-seater, dual control, training machine, equipped with 170 H.P. A.B.C. Engine

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T, Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
gene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M, Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader

Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J, McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Beliefonte Victor W. Fitch, Manager, Newark Warehouse

PILOTS

Samuel C. Eaton Robert H. Ellis James H. Knight Elmor G. Leonhardt Paul S. Oakes Paul W. Smith Frederick A. Robins Max Miller F. A. Nutter Robinson

### Air Mail Service Flies 56,000 Miles in September

The Air Mail Service for the month of September flew 56,744 miles, carrying the mail with only 14 temporary interruptions due to forced landings on account of due to forced landings on account of motor trouble or weather conditions. Out of a possible 174 trips attempted, 172 were completed. On the routes from New York to Washington and from Cleveland to Chicago a performance of 100 per cent was scored, and 97½ per cent over the mountainous route from New York to Cleveland.

A total of 55,668 pounds of mail, ap-

proximately 2,226,720 letters, was carried at a cost of \$22,648.39, including 33 1/3 per cent depreciation and 6 per cent on the

investment.

The New England mail, too late for New York train connections, was advanced by mail plane every day for afternoon delivery in Washington without a single failure, the latest arrival of plane was 1:20 P. M. Likewise Southern mail, failing of train connection at Washington, was advanced every day for afternoon de-livery in New York without a single failure, the latest arrival was 1:49 P.

No fatalities or serious accidents oc-

curred during the month.

### Martin Mail Plane in Non-Stop Flight From Cleveland

Washington, D. €.-Walter H. Stevens piloted one of the new Martin mail planes with 840 pounds of mail from Cleveland to Belmont Park on November 24. The flying time for the 400 miles was three hours and fifty-five minutes.

Very cold weather and a snow storm over the Alleghenies was encountered on the flight and a temperature of 15 degrees below zero recorded at a 7,000-foot alti-

### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-CHICAGO ROUTE Monthly Report of Operation and Maintenance OCTOBER, 1919

				_	uel,			75					SERVICE AND UNIT COST					
Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
64 65 66 67 71 72 74 75 76 77 79 81 83 85 86 87 88 90 91 92 93 94 95 98 24227	\$246.78 229.53 350.60 154.33 20.30 117.61 105.34 191.19 294.53 314.66 190.26 217.26 120.82 238.97 80.78 148.30 333.91 130.21 38.98 87.82 55.86	\$43.50 42.60 52.85 522.85 5.24 11.10 21.25 30.96 4.90 23.40 53.71 27.13 31.68 31.68 13.40 17.65 5.65 5.65 8.18 6.80	\$122.31 122.31 122.31 122.31 122.31 122.31 122.31 122.31 122.31 122.31 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30 122.30	\$46.29 46.29 46.29 46.29 46.29 46.29 46.29 46.29 46.29 46.29 46.28 46.28 46.28 46.28 46.28 46.28 46.28	\$20. 12 20. 11 20. 11 20. 11 20. 11	\$62.95 62.95 62.95 62.95 62.95 62.95 62.95 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96 62.96	\$220.37 182.40 309.56 145.16 18.87 74.97 121.28 109.39 284.32 285.21 199.80 183.87 152.51 230.55 30.87	\$198.24 185.01 253.06 137.35 176.63 177.92 250.47 182.39 235.87 25.30 157.71 171.54 124.87 169.95 8.01 168.12 207.64 152.53 103.50 57.36 157.36 157.37	\$342.28 22.53 183.61 36.18 148.57 145.18 726.69 231.44 254.80 8.67 38.53 132.27 103.33  136.97 21.51 327.26 340.57 22.18 22.18 30.72 11.67	\$50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 50.00 60.00 48.50 42.85 50.00 50.00 50.00 50.00 60.00 40.50	\$98.66 98.66 98.66 98.66 98.66 98.67 98.67 98.67 98.67 98.67 98.67 98.67 98.67 98.67 98.67 98.67 98.67	\$1,451.50 1,062.40 1,550.01 895.63 769.94 927.13 1,625.37 1,145.71 1,512.65 534.11 1,512.65 534.11 1,074.67 1,104.42 408.34 995.86 1,073.27 791.76 0.03 1,250.48 1,648.46 792.56 566.02 703.82 539.41	913 811 1,229 545 773 386 359 623 1,027 261 526 1,161 679 771  431 847 288  775 1,192 460 138 299 209	hr. min 29 59 24 49 42 07 19 45 2 34 10 12 16 30 14 53 38 41 5 13 25 31 36 05 27 11 25 01 31 22 4 12 19 25 51 51 54 16 90 95 39 83 3 00	3,099 2,214 4,476 2,138 235 1,317 1,633 2,399 3,755 530 2,144 3,496 2,405 2,363 1,580 2,769 645 1,955 1,624 511 511 580 415	3.4 2.7 3.6 3.9 3.2 3.4 4.5 3.7 2.0 4.1 3.5 3.1 2.2 2.2 2.2 2.3 3.5 3.5 3.5 3.5 3.5 3.5	42.78 36.78 45.30 299.40 90.60 97.80 76.80 39.00 102.00 39.48 44.16 47.94 34.14 194.46 64.38 31.74 49.02 90.12 90.	\$0.47 .48 .35 .42 .3 .28 .70 1.00 .48 .40 1.01 .44 .43 .47 .63 .39 1.23 .63 .48 .49 .49 1.11 1.21 1.30
Total.	\$3,891.99	\$576.26	\$3,057.62	\$1,157.13	\$502.93	\$1,573.92	\$3,503.58	\$3,694.54	\$3,575.24	\$1,198.58	\$2,466.70	\$25,198.59	14,003	476 35	45,778	3.3	\$52.86	\$0.55

### THE VIKING AIRCRAFT MOTOR

HIS motor is manufactured by the Detroit Manufacturers' Syndicate, Inc., Detroit, Michigan.

Specifications: Sixteen-cylinder, air-cooled, X type, having four rows of cylinders of four cylinders each, set at 90° angle.

The motor is 31/4 in. bore by 4 in. stroke and develops 140 h.p. at 1600 r.p.m.

Cylinders are made of semi-steel, machined inside and outside, and are ground to finished dimensions.

Crankcase is made of aluminum alloy of finest grade, internally braced with a cross web every  $4\frac{1}{2}$  inches the entire length of the case, which is only 36 inches long. These seven webs support the main bearings.

The cylinders are attached to the crankcase by four base bolts and four long binding bolts each.

Crankshaft has eight throws with eleven main bearings and sixteen connecting rod bearings. The main bearings are numbered 214 annular type ball, and the connecting rod bearings No. 309 annular type ball. Each connecting rod bearing contains fifteen 5%-inch balls. The crank being of the built-up type is made of best grade vanadium steel and bound together by means for which patents have been applied.

Two camshafts are used, made of best vanadium steel forgings, finished and ground to accurate size and housed in plain bearings.

Connecting rods are drop forged from vanadium steel,

machined to a light press fit on the crankshaft annular bearings and a tight press fit on the piston pins, which are made out of cold-drawn seamless steel tubing, pack hardened, ground and hand-buffed. The connecting rods are placed side by side on the crank and are all interchangeable.

Zephyr pistons, aluminum alloy, manufactured by the Wridgway Co., Inc., are used.

Valves are made of the semi-steel heads, welded to nickel steel stems. Size  $1\frac{5}{8}$  O. D., clear opening  $1\frac{7}{8}$ -inch by  $\frac{5}{8}$ -inch lift, operated by overhead rocker arms and mushroom lifters.

Ignition by high tension Dixie magneto.

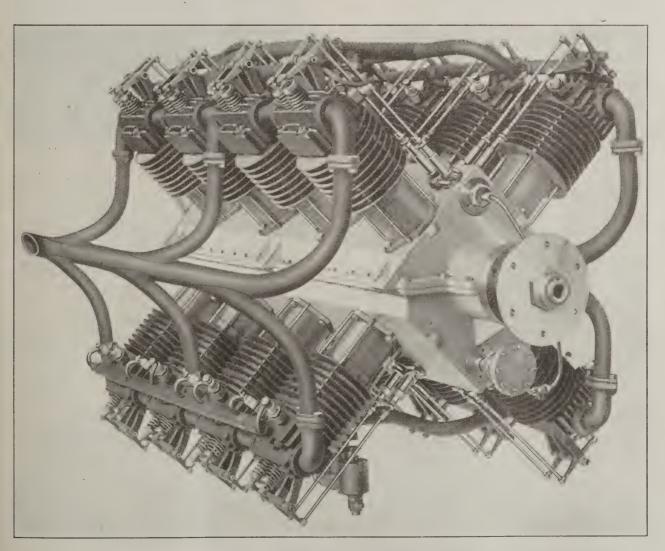
The motor is lubricated by a fine vapor of oil, sprayed under pressure to all parts of the motor, through holes drilled into the upper hollow camshaft, which registers with the center of each crank throw.

Two oil pumps are used. One for the force feed lubrication and one to scavenge the crankcase, which it does to such an extent that there is never more than ½ pint of oil in same at any given time.

The total weight of the motor, equipped with magneto and carbureters, less propeller, is approximately 396 pounds.

The gas consumption is about five gallons per hour, at 1400 r.p.m. and six gallons per hour at 1600 r.p.m., using a propeller 8 ft. in diameter by 5 ft. 3 in. pitch.

One of the good features of the motor is interchangeability, and it is so standardized that very few parts are used.



The Sixteen Cylinder, Air Cooled, Viking Aircraft Motor

### THE GERMAN D. F. W. COMMERCIAL FOUR **ENGINED BIPLANE**

N spite of the handicaps caused by the Peace conditions, German aircraft firms are losing no time in getting going on their post-war commercial aeroplanes. Since the conclusion of hostilities several firms have commenced the construction of large multi-engined passenger carriers. Among these is the D. F. W. firm (Deutsche Flugzeug Werke), who have nearing completion a large four-engined biplane, designed to carry 24 passengers. This machine is a development of the military type built during the war, and before commencing a description of the commercial machine a brief reference to its prototypes may be of interest.

It was in September, 1915, that the D.F.W. works commenced the construction of their first multi-engined type, the R. I. This machine was fitted with four 220 h.p. Mercedes engines placed in the fuselage and driving airscrews on the wings by means of bevel gears and shafts. The four engines were arranged inside the fuselage, two on each side, one above wings by means of bevel gears and shafts. The four engines were arranged inside the fuselage, two on each side, one above the other, leaving a central gangway between them. Under the floor-boards, in front of and behind the engines, the tanks were placed, three in front and three behind. The amount of fuel carried was sufficient for a flight of six hours' duration. Each engine was provided with a transmission-drive to airscrews placed on the wings, and the screws were geared down to run at 900 r.p.m. Generally speaking, the power plant was so arranged that each engine, with its transmission-drive and propeller, formed a complete unit which functioned quite independently of the other three. The trial flights are said to have taken place without any breakdowns occurring, and after a total of eight hours in the air the machine was considered ready for her acceptance tests, which took place on October 19, 1916. When weighed for this test the weight of the machine empty was found to be 6,800 kg. (15,000 lbs.), and the various loads required by the military authorities amounted to 2,600 kg. (5,700 lbs.), bringing the total weight in flying trim up to 9,400 kg. (20,700 lbs.). The wing loading worked out at about 10.3 lbs./sq. ft., and the power loading at 23.5 lbs./h.p. With this loading the performance during the aceptance tests was as follows: 3,300 ft. in 10 mins.; 6,600 ft. in 25 mins.; and 10,900 ft. in 53 mins. The maximum speed attained was 130 km. (78 miles) perhour. After a flight of 2½ hours' duration the machine landed without mishap at Doberitz. without mishap at Doberitz.

without mishap at Doberitz.

During further test flights at Doberitz—after the machine had been taken over by the Flying Service—trouble was experienced with the crankshafts, which continued to break. This was put down to the excessive length of the eight-cylindered engines, and also to faulty engine mountings. These were re-designed, and the transmission shafts were provided with universal joints. These alterations were completed in March, 1917, and towards the end of that month a trial flight of two hours' duration was made, during which no trouble was experienced. On April 30, 1917, the machine was flown across the Eastern Front, the trip to Konigsberg being made in 3 hours 55 mins. The experience gained with this type was so satisfactory that the D. F. W. works received an order for six more, these, however, to be fitted with four 260 h.p. Mercedes engines, and to be able to carry a useful

load of 3,400 kg. (7,500 lbs.) instead of the useful load of 5,700 lbs. carried by the first machine.

5,700 lbs. carried by the first machine.

The fitting of larger engines, and the demand for a higher useful load, necessarily resulted in a somewhat larger machine. This became known as the Type R II, the first of which was commenced in the early part of 1918. The transmission system was, generally speaking, similar to that of the R I. The first of the R II machines made its first trial flight towards the end of August, 1918. Again transmission troubles developed, and the transmission shafts, which ran at 3,000 r.p.m., showed excessive vibration. In order to stop this the shafts were enclosed in tubes, which arrangement appears to have were enclosed in tubes, which arrangement appears to have



The propeller gearing on the D. F. W. commercial biplane

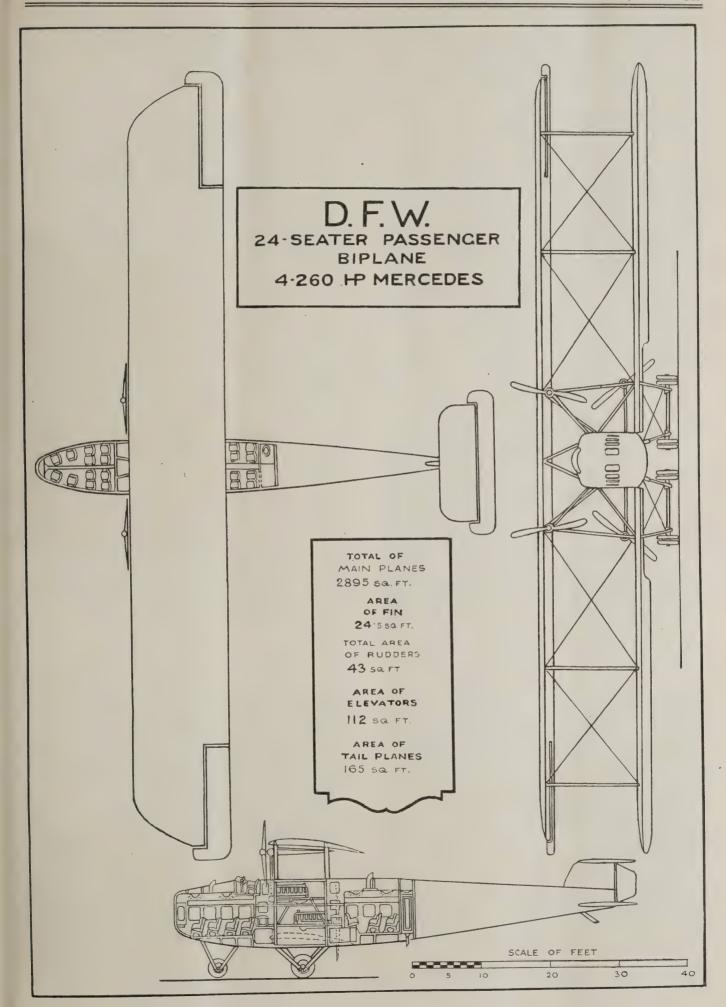
had the desired effect, as no more transmission trouble was, it is said, experienced. The weight empty of the R II was 8,600 kg. (18,900 lbs.), and the total loaded weight somewhere about 12,000 kg. (26,500 lbs.). The power load was 25.25 lbs./h.p., and the wing loading 9 lbs./sq. ft.

Before describing the 24-seater passenger machine, it might be mentioned that the D. F. W. firm had the drawings ready for a giant war machine. With the signing of peace this machine was not required and was therefore never built. It

machine was not required, and was, therefore, never built. is nevertheless of interest in showing the ambitious designs which were entertained by the Germans towards the end of the war. This machine, which, had it materialized, would



The four-motored D. F. W. commercial biplane



have been the largest aeroplane in the world-according to the Germans—was to be fitted with eight engines, each of 270 h.p., or a total of 2,160 h.p. The engines were to be started by a compressed air starter operated by an engine of 120 h.p. The same engine would probably be used for driving the electric generator furnishing current for lighting, heating, and wireless. In addition to an armament of eight machine-guns, the machine was to carry 5,500 lbs. of bombs. It will be noticed that in spite of its size the giant D. F. W. was to be fitted with a monoplane tail.

### The D. F. W. Passenger Carrier

As in the case of the military machine, the passenger carrier has a fuselage built entirely of wood. There are four main longerons, to which transverse formers are attached at intervals. In places there are incorporated in the construction steel tube struts and wire bracing. The floor-boards, gangways, etc., are so designed as to assist in rendering the fuselage structure rigid. Special attention has been paid to the engine installation. The engines are mounted on a structure of pressed steel inside the fuselage, two on each side, one slightly ahead of and above the other. The points where the members of this pressed steel framework are secured to the fuselage also serve as attachments for wings and underthe fuselage also serve as attachments for wings and under-carriage struts. The whole fuselage is covered with plywood. The front and rear portions of the body provide accommodation for the passengers, while the central portion is the engine-room. In each of the passenger cabins there are twelve seats, so arranged as to give the occupants a good view out through the numerous windows with which the cabins are provided. Electric lighting and heating are provided, and a wireless outfit is carried. Fire extinguishers are placed at suitable points throughout the fuselage, and all modern conveniences are provided.

As will be seen from the illustrations, the machine is a biplane, with its top plane in three sections. There is a center section to which the two end sections are attached. center section to which the two end sections are attached. The power plane consists really of four sections, the two inner ones of which, however, remain in place. The end sections are jointed to the short wing roots of the bottom plane at the point where occur the attachments of the outer undercarriage struts and propeller struts. When the end sections of top and bottom planes are dismantled, the top center section and the two short bottom plane roots remain in place, with their strutting, propeller drives, etc. The wing construction is of more or less standard form, with sparsard ribs of wood built-up sections being glued with waterand ribs of wood, built-up sections being glued with water-proof glue. The wing bracing is in the form of duplicate steel cables. Ailerons are fitted to the top plane only.

The tail, it will be seen, is of the biplane type, fin is built integal with the fuselage and is covered with ply-wood. The two tail planes are attached to the fin and to the fuselage respectively. The bracing is by struts and the case of the main planes. The elevators are

mounted on ball bearings at the rear edge of the tail planes, and the rudders are attached to the rear inter-tail plane struts. The elevator and rudder control cables pass inside the body through suitable guides, while the aileron cables pass over pulleys in the lower plane, and hence to the controls.

The arrangement of the undercarriage will be understood from an inspection of the general arrangement drawings. There is an undercarriage on each side, consisting of two Vees of streamline steel tubes, the inner one of which is attached to the fuselage, while the outer one is bolted to the bottom plane. The two Vees are braced diagonally by steel bottom plane. The two Vees are braced diagonally by steel cables. The axles are of chrome nickel steel, slung from the apices of the vees by rubber cord, and rest in a slot in a plywood fairing. In order to prevent the machine from turning on its nose on landing, a front undercarriage is fitted towards the nose of the fuselage. A swivelling tail skid is mounted direct in the rear part of the body.

As already mentioned, the motors are placed inside the fuselage, above one another, and it is said that as a result of keeping the whole central portion of body and wings a complete unit, this part of the structure is very rigid, and that as a consequence no transmission troubles are experienced. As will be seen from the side elevation, the upper engines have their gear end facing forward, while the lower engines are placed the reverse way. The two front engines drive airscrews placed on the front spars of the top plane, while the screws placed on the front spars of the top plane, while the lower engines drive pushers situated near the rear spars of the lower plane. Consequently the engine shafts and propeller shafts are parallel with one another, and the drive is by sloping shafts and bevel gears. The size of the bevel gears is so proportioned that a gear reduction of 14 to 9 is obtained. That is to say, when the engines are making 1,400 r.p.m. the airscrews are revolving at 900 r.p.m. It is claimed that by placing the tractors high and the pushers low as indicated, both are working in undisturbed air, and that this fact, in conjunction with the slow running of the airthis fact, in conjunction with the slow running of the air-screws' 900 r.p.m., makes for very high airscrew efficiency. It is also claimed that in case of one engine cutting out the It is also claimed that in case of one engine cutting out the trim can be maintained by use of rudder and elevators. As the distance between airscrews is fairly great, this claim might be open to doubt. It is said that the machine will fly comfortably with only two engines running, and while this is probably true as regards the actual power, it may be doubted in view of the points of application of the power. In other words, if the trim of the machine is right with all engines working, it is doubtful whether it would be with, for instance, only the tractors pulling as the center of thrust instance, only the tractors pulling, as the center of thrust would be in that case very much too high. As naturally the transmission bearings are subject to considerable loads, it is important to be in a position to know always what is their condition. To this end all the bearings in the transmission system are provided with electric thermometers which indicate gasoline tanks placed in the body, each holding 350 litres.

### (Continued from page 336)

hydrogen, helium gas is doing away with the greatest menace to the use of dirigibles and balloons, and indicates the estab-lishment of mammoth helium gas producing plants in this section, where the natural gases needed are to be found. the use of great quantities of gasoline and lubricating oils by aeroplanes, seaplanes and dirigibles leads to the belief that aircraft development will be rapid in the region where these oil products can be procured most abundantly and most economically.

Rapid development of aerial photography during the last four years has brought into play rapid and economical methods of making maps, especially of inaccessible regions such as or making maps, especially or inaccessible regions such as steep mountains, great deserts or extensive swamps. Com-plete and accurate maps may be made from vertical photo-graphs taken from aeroplanes. Even better maps may result in the future from photographs taken from dirigible airships, which can remain in the air longer and can be moved more slowly or stopped, raised or lowered as the situation requires.

In this section the Government already has acknowledged the possibilities of using observers, captive balloons and aeroplanes as watchmen for quickly and accurately locating fires in the great forest reserves. A plane now is flying daily at the Arcadia balloon school from 7 A. M. until 3:30 P. M. at

3,000 feet altitude in order to guard the Angeles forest reserve. Two aeroplane patrols have been inaugurated from Riverside, covering a large area to the eastward of Government land. This new and valuable service indicates the possiment land. This new and valuable service indicates the possibility of aerial patrols for all of the great forest reserves near Los Angeles and a specialized service in properly installed alarm systems, trucks and personnel for combatting the fires in the regions surveyed from the air. It is only reasonable to expect that such service will be extended eventually by privately owned aircraft for the watching of herds of cattle, horses and sheep and the detection of lost animals or attempts at theft or destruction. at theft or destruction.

Flying already has been recognized as king of sports. Commercial companies in and around Los Angeles have no difficulty in obtaining passengers for flights at high rates. business is increasing daily. Sport flying is expected to develop in Los Angeles at a faster rate than anywhere, owing to the large number of wealthy citizens living here and the ideal conditions for flying,

Unless these signs, which are based on what knowledge exists in flying, fail, Los Angeles is destined to become not only the greatest center of aerial navigation, but the base of supplies for not only this country, but trans-Pacific countries, made easily accessible through Los Angeles harbor.

### 329

### MODERN WING COVERINGS—MATERIALS USED AND THEIR APPLICATION

By R. G. DORT, A.M.

### INTRODUCTION

URING the war the development of wing coverings was rapid. Many of the changes followed one another so quickly that reasons for these deviations from previously established practice were not understood. Not only were the basic reasons for the changes not always understood, but in some quarters only part of the changes themselves were in-

stituted.

This discussion will attempt to outline the best and latest practice in wing covering matters—both the materials used and their application. Reasons will be given for the major changes from earlier wing covering procedure. The subject will be discussed first from the point of view of materials used, beginning with the basis of the wing covering—the cloth—and working up in the order in which the materials are used, through dopes, to pigmented protective coverings. The application of these materials will then be taken up in the same order.

I hroughout, the term "wing covering" will be used to designate the covering of all fabric-covered and doped parts—wings, elevators, ailerons, rudders, fins and fuselages—unless

special notation to the contrary is made.

It is well to note here that the United States has led to This wen to note here that the United States has led to date in the development of new cloths for wing coverings. This was due largely to the necessity, early after we had entered the war, of providing a substitute for the British linen, which could not—at first, at any rate—be supplied to us in quantities sufficient to meet the needs of the United States

Air Service production program.

On the other hand, the British have led in the development of dopes and pigmented protective coverings—especially the latter. A great deal of most valuable information on dopes and pigmented protective coverings has been furnished our Air Service by various agencies of the Royal Air Force—notably by the Aeronautical Inspection Department laboratories in London and by the Royal Aircraft Establishment. Too much appreciation cannot be expressed for the spirit of cordial co-operation the technicians of these two organiza-tions showed toward the American investigators of these subjects.

The modern wing covering, as is well known, is made up

of cloth, stretched tightly on the wing frame-work and secured there by reinforcing tape and lacing cord. Finishing tape is applied over the lacing and the whole is doped. The wing cover is then finished off with a coat of anti-actinic covering.

### PART I Wing Covering Materials

The standard wing cloth of the United States Air Service—and one which will prove wholly satisfactory for use on commercial planes—is of cotton. The raw material is cotton of at least 1.5 inch staple. The yarn structure is 60-2ply. The count is 80 to 84 threads per inch in both warp and filling. The weight under normal moisture conditions is not over 4.5 ounces per square yard. The yarn is unbleached and mercerized under tension. The tensile strength is 80 pounds per inch in both warp and filling. This is the so-called "Grade A" cotton, conforming to U. S. Air Service Specification 16004-A. An equally satisfactory cloth for the basis of the wing covering is the so-called "Grade A" linen. This is British-made fabric, counting 90 to 105 threads per inch in both warp and filling. The yarns are singles. The weight is not more than The standard wing cloth of the United States Air Service-

fabric, counting 90 to 105 threads per inch in both warp and filling. The yarns are singles. The weight is not more than 4.5 ounces per square yard. The tensile strength is at least 75 pounds per inch in both warp and filling. This cloth conforms to U. S. Air Service Specification 16003-B.

The Grade A cotton is probably available in considerable quantities for the use of firms manufacturing aeroplanes for commercial purposes. A large quantity of this material has been put on the market by the Government. It is thought that in certain cases and under certain conditions the Wart Department might dispose of portions of its reserve stock to Department might dispose of portions of its reserve stock to aeroplane manufacturers.

There is little Grade A linen available in the United States at the present. More may be available, as it is understood that the British Government is disposing of large quantities of this material. Both the above cloths are of proved worth and safety for use on any type of plane at present developed. Certain precautions to be taken in doping the cotton will be noted under dope application.

Besides the two Grade A cloths referred to above, there are various other grades both in cotton and linen. Linen Grade B has been used on training planes as a wing cloth and as fuselage covering on various types of plane. Various grades fuselage covering on various types of plane. Various grades of linen (such as Grades C, D, L2, V, etc.) are suitable for use as fuselage cloth, or, in some cases, as wing cloth on low-powered planes. It is to be noted that it is poor practice to use different grades of cloth for wings and fuselage in peace time production of planes, when the supply of any one particular grade is probably ample. Two grades of cloth—one for fuselage and one for wings—are bound to cause confusion in

tuselage and one for wings—are bound to cause confusion in the aeroplane plant cloth cutting room.

The Grade B cotton cloth (U. S. Air Service Specification 16005-A) may be dismissed with a word. It is a lighter cloth (4.0 ounces to the square yard) than the Grade A cotton. It is somewhat less strong—73 pounds per inch in warp and filling, specified as minimum. Its use was for training planes. The Grade A is a better proposition for wings from every point of view.

point of view.

Besides this Grade B, there are two other grades of cotton which are important as developments, though not yet, so far as is known, on the market. One of these cloths is a special, heavy fabric cotton, especially designed to meet the combat conditions under which low-flying, armored, trench-strafing planes fly. Bad rents in the wings from shrapnel and machine gun fire are to be expected in trench-strafing and other low-flying planes. This heavy 7-ounce-to-the-square-yard fabric (U. S. Air Service Specification 16032) is designed to have a high tearing resistance so that wounds once started will be less likely to extend in flight. This cloth is stronger than is necessary for conditions of ordinary flight and is of use only for the special purpose outlined.

The other appaid

The other special cotton cloth which will be discussed here is one for use where extreme lightness coupled with strength is of value. It is a 3.5-ounce-to-the-square-yard fabric with a minimum strength of 100 pounds per inch in the direction a minimum strength of 100 pounds per inch in the direction of the filling threads and a strength of 38 pounds per inch in the direction of the warp (U. S. Air Service Specification 16028). The cloth was designed on the theory that most of the stress on a wing covering is from rib to rib—i. e., in the direction of the filling yarns when the cloth is applied to the wing frame-work with warp threads parallel to the line of flight. This is a theory based on sound physics and consideration of the stretch available in the two directions of the fabric samplied to the rectangular wing frame-work opening. In as applied to the rectangular wing frame-work opening. as applied to the rectangular wing frame-work opening. In test this 3.5-ounce fabric has taken sixty minutes to tear the same distance wihch Grade A linen tore in under three minutes. The test was in the slipstream of a Liberty motor, the wing covering being previously doped and wounded. This fabric is now in flight on various experimental planes. It should prove of value commercially for certain specialized purposes. It is emphasized, however, that this fabric must be applied to the wing with the warp threads coralled to the line. applied to the wing with the warp threads parallel to the line of flight. Otherwise, the results may be the exact opposite

In general the identification of the different cloths and their In general the identification of the different cloths and their grades is not difficult. Cotton can be told from linen by the feel and the color. The feel of linen is generally less smooth and uniform than that of cotton. The color of linen is generally darker than that of cotton. Different pieces and bolts of linen will be of different colors, whereas the cotton is all practically uniform in color. The different grades of linen are to be distinguished sometimes by color—more surely by thread count. (See British linen specifications)

thread count. (See British linen specifications.)

The different grades of cotton may be told by thread struc-The different grades of cotton may be told by thread structure most simply. If a thread of Grade A cotton aeroplane cloth is untwisted between the fingers, it will be found to be made up of two yarns—hence 60-2ply. Similarly Grade B cotton may be identified by untwisting a thread. It will be found to be made of three yarns—hence 80-2ply. In both the above cotton cloths the yarn structure will be found to be the same in both warp and filling. In the 3.5-ounce fabric, a thread in one direction—say the filling—will, on untwisting, be found to be made up of two yarns. A thread from the found to fabric in the opposite direction—the warp—will be found to fabric in the opposite direction—the warp—will be found to be a single yarn, i. e., will not untwist between the fingers into two or more integral yarns. The 7-ounce cloth is easy to distinguish because of its weight, feel and coarser basket weave

Summed up, for all-around use and comparatively easy procurability in this country Grade A cotton will be found best for commercial aeroplane manufacturers. Grade A linen is equally satisfactory if procurable. The 7-ounce and 3.5-ounce

cotton fabrics will be found useful for certain purposes. tain cotton fabrics on the cord principle are being developed and show considerable promise. Flight tests on these cloths are awaited with interest.

### Reinforcing Tape

Reinforcing tape is used on top of the cloth, following along the ribs, under the lacing cord. Its use was adopted following the crashes of some of the first Liberty-motored planes when the fabric ripped from the wings. These planes had been covered with Grade A cotton. The fabric was suspected because cotton had just come into use. Samples of fabric from the wrecked planes were carefully tested and the strength was shown to be the equal of linen. What was strength was shown to be the equal of linen. What was found was that the lacing cord had in some places broken (see below for a discussion of this) and had in some places cut through the fabric. There was no reinforcing tape on these planes. Under the increased vibration, brought about by the higher powered motors over that of the planes of the earlier types, the lacing cord had cut through the fabric, and where the next few stitches had broken the rush of air had caught the wing covering and ripped it off. A contributary cause was probably the inadequate doping of the cotton, from the point of view of tautness and from the point of view of overpenetration. The first would lead to greater vibration; the second to reduction of tearing resistance in the doped fabric second to reduction of tearing resistance in the doped fabric

The immediate result of these accidents was the specifica-

The immediate result of these accidents was the specification of reinforcing tape under the lacing stitches and the use of a different type of lacing cord. (See below.)

The specified reinforcing tape (U. S. Air Service Specification 16027) is of 1.5-inch staple cotton, 0.5 inches wide, woven of fourteen 20-12ply threads in the warp. The minimum tensile strength of this tape in the warp is 150 pounds for the width. The filling is of 20-2ply yarns, 24 to 26 to the inch. The filling is merely to hold the warp threads in place, as it is obvious that all the stress of the lacing cord, when the American system of lacing is used, will be across the warp threads. Picot edges are specified for this tape. This is not essential. A wider tape of the same weave would be convenient for box-ribs. venient for box-ribs.

As it required some time to put this tape into production, makeshifts were used at first. These consisted of doubled strips of wing fabric of the proper width, and various commercial tapes of the "herring-bone" type. So far as is known, these tapes functioned properly and were not the cause of trouble. The specially designed heavy tape noted above is, however, the tape to use whenever it is procurable.

### Lacing Cord

The earlier lacing cords (sometimes called quilting cord) were of seven and five cord linen. Some of the lacing cord then in use was even smaller. The writer has seen even recently on certain commercial planes lacing cord of a size and type entirely inadequate. The fact that resistance to fricand type entirely inadequate. The fact that resistance to friction and tension fray is more important thant great tensile strength in a lacing cord seems to have been completely missed by the very early plane designers and by some plant engineers not following Air Service specifications now. Together with the absence of reinforcing tape and consequent cutting through the fabric by the lacing cord, the breaking of the lacing cord due to friction and tension fray was responsible for the wing covering failures in the early high-powered planes in this country.

The best lacing cord to-day obtainable is that which conforms to U. S. Air Service Specification 16019 or 16020. These cords are of cotton of at least 1.25-inch staple. The first is a 20-3ply 4ply 3ply cord; the second is a 20-3ply 3ply 3ply cord. The twenties yarn are first plied three times; then these three or four times (depending on which cord is being considered) and these in turn three times again. The resulting plied cord is highly resistant to friction and tension fray. The tensile is highly resistant to friction and tension fray. The tensile strength specified is at least 85 pounds when tested double and without knot—ample for the purpose.

and without knot—ample for the purpose.

In tests to simulate the fraying of the cord when rubbing on the leading edge and other tests to simulate the tension fray between the cap-strips due to the alternate tension and relaxation due to vibration, the importance of the use of wax was shown. The wax to be used on lacing cords must be pure beeswax. Otherwise on doping, blistering of the dope over the stitches is sure to occur. In these tests the two over the stitches is sure to occur. In these tests the two cotton cords above referred to showed results superior to the nine-cord linen. The nine-cord linen lacing cord is satisfactory when properly waxed. It should conform to U. S. Air Service Specification 16017-A.

To identify the lacing cords above referred to, untwisting and counting the yarn is resorted to. The 20-3ply 3ply 3ply cord when untwisted first will show three yarns; one of these untwisted will show three again; one of this second set untwisted will show three a third time. The 20-3ply 4ply 3ply

cord will show the same except that the second untwisting will reveal four yarns each made up of three. The nine-cord linen lacing cord will show nine strands on untwisting; the

Inen lacing cord will snow nine strands on untwisting; the seven and five cord linens seven and five strands respectively. Any other lacing cords, whether of cotton or linen, are danger points when used on the wing coverings of high-powered planes. Plane after plane using light lacing cord—whose tensile strength is more than ample—have been found with broken stitches. Broken stitches unless immediately remedied mean serious trouble. The use of a plied or corded lacing cord, which will resist friction fray is essential lacing cord, which will resist friction fray, is essential.

Finishing Tape
Finishing tape—sometimes called surface tape—is used over the lacing along the ribs for two reasons—to perfect the streamlining of the wing and to protect from the weather the holes made by the needle in lacing. As no structural purpose is served by this material, its choice is one of convenience and cheapness.

The standard finishing tape in the air service is made of imperfect pieces of Grade A or Grade B cotton, and conforms to U. S. Air Service Specification 16014-A. It is made in two widths—2.25 and 3.75 inches—and has along each edge eight ½-inch pinks per inch. In some plants much difficulty was experienced in doping these pinks flat. This is a real fault in the present pinked edge tape. One with smaller conflored and helf as many against sever inch world remedies. scallops and half as many again or so per inch would remedy the trouble.

Another finishing tape much used in this country is of linen with frayed edges, of approximately the same dimensions throughout as the cotton tape above referred to. Some constructors prefer, for the sake of appearance, a linen tape on a linen wing covering. Some difficulty is occasionally experienced with the threads sticking up after doping, as in the case with the pinked edges of the cotton tape. Careful manipulation by the workmen can obviate this. For general use, however, the cotton tape, with a greater number of pinks per inch than at present used, is preferable.

One important point must be noted. If any large amount of sizing is present in the finishing tape, it will be practically impossible to make the tape adhere properly to the wing cover. The amount of sizing should not be over 3.5 per cent. when determined by the diastofor process. Another finishing tape much used in this country is of linen

determined by the diastofor process.

Very coarse cheese-cloth—approximating mosquito netting—has been cut in strips and used as finishing tape in at least one plant in this country. The adhesion is, of course, excellent. The use of such material is, however, not advised owing to the fact that no matter how well the pigmented protective covering is applied the holes in the cover made by the lacing needle will be left unprotected and open.

Dopes

There are three main functions which dope plays in producing a satisfactory wing covering. First, it tightens the cloth, probably by its own contraction as it dries, rather than by any actual shrinking action on the fibers of the cloth, such as water has. Secondly, it helps protect the wing cover from the weather. Thirdly, it smooths the surface reducing skin

The first function above cited may be called the most important. Taut wings are essential to the best performance of the plane from the point of view of speed and climb. They are equally essential from the point of view of actual safety. Flabby wing covers give more chance for fabric vibration and for greater magnitude in vibration. This means greater friction and tension from on the loging cords and more liabilities. and for greater magnitude in vibration. This means greater friction and tension fray on the lacing cords and more liability of lacing cords cutting through the cover. This last contingency has never been known to happen where proper reinforcing tape was used. (See above.) But the highly developed 20-3ply 3ply 3ply lacing cord has been known to break from vibratory fray stresses on the wing of a British-built De Haviland with a Liberty motor. The reinforcing ribs had not been put in these wings. The rib spacing was, therefore, some fourteen inches in the slipstream. When received the wing covering was very flabby—far more so than therefore, some fourteen inches in the slipstream. When received, the wing covering was very flabby—far more so than the standard wing covers one sees at the Royal Aircraft Establishment. The original lacing cords quickly broke. The slipstream was replaced with the U. S. Air Service standard lacing cord referred to above. This broke also, in several places, although it stood up longer than the original cord used.

This instance merely goes to show that without proper tautness from doping, vibratory stresses will arise in flight which will endanger the attachment of the wing cover to the wing framework, especially if the rib spacing be wide.

Two kinds of dope have been used in the United States—

cellulose nitrate and cellulose acetate dopes.

### Nitrate Dope

Cellulose nitrate dope is similar to the familiar collodion solutions—the lower nitrates of cellulose dissolved in suitable (Continued on page 335)

# THE THIRD PAN AMERICAN AERONAUTIC CONGRESS

WILL BE HELD AT

# HAVANA, CUBA FEBRUARY 21st to MARCH 1st

UNDER THE AUSPICES OF

The Liga Aerea Cubana, The Aero Club of America, The Aero League of America, La Federacion Aeronautica Pan Americana, and the Aerial Touring Association.

Exposition of World's Best Aircraft. Competitions for over \$25,000 in Prizes. Discussions of Important Phases of Aeronautic Science by World's Leading Authorities.



El Tercer Congreso y Exposition
Aeronautica Pan-Americana

Celebrada bajo los auspicios de la "Liga Aerea de Cuba," el "Aero Club de America," la "Liga Aerea de America," la "Gederacion Aeronautica Pan-Americana," y "Asociacion del Turismo Aero."

Desde el Sabado, Febrero 21 hasta el primero de Marzo ambos inclusives de 1920, en la Habana, Republica de Cuba.

PROGRAMA.

Concursos que se verificaran todos los Dias

1. Concurso de Hidroaeroplanos (eu general).
2. Trofeo y Premios de Curtiss por aviacion maritima.
3. Concurso de Aeroplanos Terrestres.
4. Concurso de Paracadas.

PROGRAMA DIANO

1. Exhibicion de aeroplanos, motoras y sus accesorias en el Salon de Exhibiciones.
2. Demostracion y Ensyso de Hidroaeroplanos, Aeroplanos, Terrestres, Motoras, Globos, Dirigibles y Globos Cautinos para compradores.
3. Vistas Cinemalografas y Discursos sobre las fases mas importantes de lo aeronautica.

Los Gobiernos de los Estados Unios, Argentina, Brasil, Bolivia, Chile, Columbia, Costa Rica, Republica Dominicana, Ecuador, Honduras, Haiti, Panama, Guatemala, Paraguay, Peru, Portugat, El Salvador, Espana, Urugay, Venizucla, Majico, y Nicaragua, asi como los Sociedades Aeronauticas, Deportusa, Sientificas, Industrales y Givisas, de los mismos paires, por la presenta quedan principal del Cemite energardo de la Convención en el Hotol Plaza, para inaribizes y al proprio tiempo recibir sus credenciale y copia del programa oficial.

El Comié de la Convención tendra representantes en las oficinis de la Convención en el Hotol Plaza, para inaribizes y al proprio tiempo recibir sus credenciale y copia del programa oficial.

El Comié de la Convención tendra representantes en las oficinis de la Convención en el Tratar Nacional la sección aparrada para las oficinis de la Convención en el Tratar Nacional la sección aparrada para las oficinis de la Convención en el Tratar Nacional la sección aparrada para las oficinis de la Convención en el Tratar Nacional la sección aparrada para las oficinis de la Convención en el Tratar Nacional la sec

Troisieme Convention et Exposition
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Sous les auspices de la Ligue Aerrienne de Cuba, l'Aero
Club of America, The Aerial League of America, la Federacion Aeronautique Pan-Americaine et l'Association du
Tourisme Aerien.

Du Samedi 21 Fevrier, 1920 au Lundi I Mars, inclus. a
HABANA, CUBA

Concours Devant Etre Tenus Chaque Jour. \$25,000 Prix.

1. Councours d'hydravions.
2. Trophee et Prix Curtiss
pour Aviation Navale.
3. Councours de Parachutes.
6. Councours de Dirigeables.
6. Councours de paraghits.

EPREUVES QUOTIDIENNES

1. Exposition d'Avions, Moteurs et Accessoires.
2. Demonstration et assais d'hydravions et dirigeables, vallons captifs aux acheteurs evencuels.
3. Transport de passagars par hydravions et dirigeables, et ascensions en ballons captifs.
4. Representations cinematographiques et conferences sur les phases les plus importantes de aeronautique.

Le Gouvernement Francais, les organisations aeronautiques, sportives, scientifiques, industrielles, et civiques de France sont invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants ont invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a envoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a catoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a catoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a catoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces representants in invites a catoyer des representants pour assister a cette grande convention aeronautique. En arrivant a Cuba ces Troisieme Convention et Exposition
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3. Councours de Parachutes.
6. Councours de rapidits d'ascension, de descente et de manoeuvre pour ballons capitis.

EPREUVES QUOTIDIENNES
1. Exposition d'Avions, Moteurs et Accessoires.
2. Demonstration et assais d'hydravions et dirigeables, et ascensions en ballons capitis.
3. Transport de passagars par hydravions et dirigeables, et ascensions en ballons capitis.
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Toutes comunications devront etre addressees a Monsieur E. S. Azpiazu, Exposition Committee, Liga Aerea de Cuba, Manzana de Gomez, Habana, Cuba.

# Terza Convenzione ed Esposizione Aeronautica Pan-Americana Sotto gli Auspici della Liga Aerea Cubana, dell'Aero Club of America, dell'Aerial League of America, La Federazione Aeronautica Pan-Americana ed the Aerial Touring Association. Dal 21 Febbraio al Primo di Marzo ad HABANA, CUBA PROGRAMMA Gare Che Avranno Luogo Ogni Giorno 1. Gare Idroplani (generale). 2. Voli nautici apparecchio tipo Curtiss-Trofei e Premi. 3. Gare Aeroplani di terra. 4. Gare Dirigibili. 5. Gare Velocita asocsa e discesa, e manovre di Palloni frenati. 6. Gare Paracadute. AVVENIMENTI QUOTIDIANI 1. Esposizione di Aeroplani, Motori ed accessori. 2. Escroitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili Pallanifrennati. 3. Transporto Aereo passeggeri su Idroplani, e Dirigibili Ascensioni Palloni frenati. 4. Spettacolo cinematografico e discorsi sul clpiu importanti fasi dell' Aeronautica, dell'ordine seguente: Il Governo d'Italia e le organizzazione italiane di Aeronuatica di Sport e di Scienze d'Italia ed Italiane all estero sono invitati a mandare rappresentanti ad assistere a questo grande evento aeronautico. Arrivando a Habana, Cuba, i Signori Rappresentanti dovranno presentarsi al Quartiere Generale del Comitato al Hotel Plaza, per registrasie ricevere la targhetta ufficiale, nonche il programma. Ogni comunicazione devra essere indirizzata al Signor E. S. Azpiazu, Exposition Committee, Liga Aerea de Cuba, Manzana de Gomez, Habana, Cuba.

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(Continued from page 330)

solvents such as amyl acetate and butyl acetate, with various thinners such as ethyl alcohol, with or without such fire-proofing mediums as tryphenylphosphate or ammonium phos-Calcium chloride has been tried as a fire-retarding. It has not been satisfactory owing to its tendency medium. to collect moisture after the film is dry.

Nitrate dope is cheaper than acetate dope. In some quarters it is considered that it gives better tautness than acetate dope. This opinion is not correct. Maximum tautness is attained by the use of nitrate dope somewhat more quickly than with

acetate dope. But the better acetate dopes give as good taut-

ness when properly applied.

In the fields nitrate dope has been preferred because of the difficulty experienced with the "blushing" or "whitening" of some of the acetate dopes. The earlier acetate dopes with insufficient "high-boilers" caused much trouble in this way. The perfected acetate dopes can scarcely be made to blush.

Nitrate dope has been definitely abandoned by the United States Air Service for two good reasons which apply equally well to the commercial use of this medium. The first reason is the inflammability of nitrate dope—it is made of the lower guncottons. The second is the possible deleterious action of

its decomposition.

A piece of ordinary nitrate doped fabric is unquestionably more inflammable than a piece of fabric similarly doped with acetate dope. A simple burning of the two will show the difference very obviously. With the ordinary doping schemes the difference will be more marked after each piece of fabric has been weathered for some time. This is for the reason that some of the nitrate dope produced in this country has in it a fire retarding medium. It happens that these fire retarding mediums are water soluble. On exposure the "non-flam" substances are slowly but surely leeched out of the nitrate dope film and any fire retarding effect entirely lost. Acetate dope films are practically non-inflammable in themselves. They require no fire retarding substances.

The use of acetate rather than nitrate dope on this score of inflammability of the latter is a precaution rather than any solution of aeroplane fires and escape from the disastrous consequences thereof. With a material of an organic base—cotton or linen cloth—as the basis of the wing cover, coupled with the tremendous heat potential in the gallons of gasoline carried in the plane, the solution of the fire problem is not in so-called fireproofing of the wings. They must be more than non-inflammable. They must not only be made of material which will not burn of itself, but also which must resist the action of the heat of burning gasoline on its surface to the extent of not charring and hence losing its strength. The the extent of not charring and hence losing its strength. real solution of the problem seems to be metallic wing covers.

In combat, wing covers, acetate doped, have been reported set on fire by incendiary machine gun bullets. This was reported through channels by the Italians in the great offensive by the Austrians in the fall of 1917. The report has never been authenticated. It is considered very doubtful that a fire could be started in nitrate-doped wings of a plane in flight

by incendiary bullets

Notwithstanding the foregoing, it has been wise to abolish he use of nitrate dope on the wings of planes as a prezautionary measure from the point of view of fire hazard. Undoubtedly the risk in the hangars, for instance, is diminshed. Something of a parallel is the law making the use of rellulose nitrate moving picture films illegal, and requiring the use of cellulose acetate films.

Inflammability of nitrate-doped fabric was not, however, the sole reason for the rejection of this material. Cellulose nitrate lope breaks down slowly on exposure into minute quantities of nitric acid. Perhaps it is more accurate to say that it has his tendency—more marked in some nitrate dopes than in others. The magnitude of the change and the speed with which it takes place are undoubtedly dependent on the care with which the cellulose nitrate itself has been made. It is lefinitely known that some nitrate dopes on test have shown his action. Nitric acid, even in minute quantities, has a apid and highly deleterious action on cloth. The result of such decomposition of nitrate dope on a wing is obvious—otting and disintegration of the wing covering. This phenomenon was observed in the early days of the war in Florida and on the Texas border on nitrate-doped planes. These planes were unprotected from the sunlight by any pigmented protective covering; the light conditions undoubtedly hastened he decomposition of the dope.

Cellulose acetate breaks down similarly, but into the weak, lope breaks down slowly on exposure into minute quantities

Cellulose acetate breaks down similarly, but into the weak, organic, acetic acid, relatively harmless when compared with he action on cloths of the strong mineral acid—nitric. Here tegain the quantities are very small. No case of weakening of wing coverings due to the decomposition of acetate dope

las ever come to the attent; of the writer.

For these reasons of inflammability and decomposition deleterious to the strength of the wing covering, acetate dope has been required in the place of nitrate on the wings of all army planes. The same reasons seem to hold good for commercial use. Acetate dopes of the proper formula are equally satisfactory from the point of view of tautness and of ease of manipulation. Price alone seems to be in favor of the nitrate

It should be noted that one nitrate doping scheme has been brought to the attention of the army authorities which seems to nearly approximate the advantages and precautions derived from the use of acetate dope. This scheme uses nitrate dope well loaded with fireproofing mediums. Following the dope is used a pigmented covering which completely waterproofs the dope and hence prevents the leeching out of the fireproofing mediums. This pigmented covering also probably returned years much the documentation of the documentation. proofing mediums. This pigmented covering also probably retards very much the decomposition of the dope and hence the deterioration of the wing cover. Tests on this dope scheme are, it is thought, under way, which ought to help settle whether or not such a scheme might be permissible for some uses and in some climates.

### Acetate Dope

The earliest cellulose acetate dope used by the Air Service in this country was a simple solution of cellulose acetate in methyl acetone, plus a small quantity of tryphenylphosphate as a plasticizer. This dope was not very satisfactory. Its chief fault was that it blushed or whitened.

Dope blushing is the precipitation of cellulose acetate from the solution, in solid form. It is caused by the deposition of moisture from the air, in turn caused by the rapid evaporation of the light solvents in the dope mixture and consequent cooling of the wet wing surface. It may be remedied in two ways—by control of the humidity and temperature conditions of the dope room and by changing the formula of the dope. Dope room conditions tending to obviate blushing will be discussed below under "Dope Application."

In the acetate dopes finally adopted for use by the United States Air Service, the second method was used to obviate blushing—i. e., the formulas were so changed that the dope contained certain comparatively non-volatile substances, called "high boilers," which are good solvents for cellulose acetate. Such substances are diacetone alcohol, benzoate and benzyl acetate—all well known to the acetate film trade. The action of these substances is to keep in solution cellulose acetate which is about to precipitate owing to the deposition of water from the atmosphere; then they themselves evaporate so slowly that not sufficient cooling is brought about to cause blushing. The expression slowness of evaporation is merely relative. Acetate dopes with these substances present are entirely dry in fifteen minutes when the "high boilers" are used in proper quantities.

The seriousness of blushing on the performance of the wing cover has been debated. Certainly, when precipitation of cellulose acetate occurs on the first coat and is taken up by the second or subsequent coats, it is not serious. On the other hand, blushing over any but a very small area—i. e., in very small detached spots—which persist after all the coats of dope are dry, is serious, in that the adhesion of the dope film to the cloth in the whitened areas is poor, and peeling will almost certainly result. In any case, merely for reasons of good workmanship, blushing—which can be avoided—should be unknown in a doping room.

Largely to obviate blushing the U.S. Standard Colliders Activity

almost certainly result. In any case, merely for reasons of good workmanship, blushing—which can be avoided—should be unknown in adoping room.

Largely to obviate blushing, the U. S. Standard Cellulose Acetate Dope No. 5 was developed in this country by the General Laboratories of the Bureau of Aircraft Production. This is a dope with a high percentage of high boilers. For general use, commercially as well as otherwise, it is considered the most satisfactory of all dopes at present on the American market. It is probably too good, in that it contains more of the expensive high boiling solvents than is necessary for most factory dope room conditions. It is a "complete" dope—i. e., it contains, besides cellulose, acetate, solvents (methyl acetate and acetone), diluents (benzol), high boilers (diacetone alcohol, benzyl acetate, methyl ethyl ketone), and a plasticizer (tryphenylphosphate). It contains as well a small quantity of urea as an antacid. The worth of this last constituent is questioned. Owing to its solvent richness it is practically impossible to make this dope blush under factory or even field conditions.

There is one drawback to the use of comparatively large amounts of high boilers. The time for the wing cover to attain maximum tautness is considerably lengthened. This does not infer that the time of becoming dry to the touch is lengthened. With U. S. Standard No. 5 Dope the wings do not acquire maximum tautness for a period of from six to twelve hours, depending on temperature and ventilation conditions in the wing drying or dope room. This is not a serious objection, except as it affects inspection. Wings doped with this dope should not be rejected by inspectors for insufficient tautness under ten hours after being dry to the touch. It is not necessary to retard application of the bigmented covering for this length of time.

Acetate dope, if well made of proper constituents, will contain very little and probably no acid. It should, in any case, contain no free mineral acid. The allowance percentage



# STRALDER the United States, the largest city on great shipping port will call for ultimate facilities and termini for the spreassary accessory.



Los Angeles the Center of Great Aeronautic Development

7ITH the recent establishment of a passenger-carrying aeroplane line between Los Angeles and San Francisco, linking the two largest cities west of St. Louis, commercial aeronautics may be said to be firmly established in

the southern California metropolis.

This most recent development followed air routes between Los Angeles and Bakersfield and Los Angeles and Fresno.

Announcements indicate that within a very short time there will be at least a dozen landing fields in operation in and will be at least a dozen landing fields in operation in and around Los Angeles. At present there are five commercial landing fields and two privates ones within the city limits. These are expected to be supplemented at an early date by landing fields and lines that will operate between San Diego, one hundred and twenty-five miles south, and Los Angeles, and between Los Angeles and Catalina Island, the famous fishing resort twenty-five miles off the coast of Los Angeles. The commercial fields already operate from two to five The commercial fields already operate from two to five passenger-carrying machines each.

While most of the planes in use are manufactured in the

east, it is expected that the machines used in the future development of aeronautics will be manufactured here. A start in this direction has been made and there are two small manufactories in Los Angeles now and several others which manufacture propellers, radiators, engines and different parts of

the planes

According to experts of the Department of Military Aero-

the United States, the largest city on the Pacific Coast and a great shipping port will call for ultimate aerial mail and freight facilities and termini for the great aeroplanes and dirigibles with the necessary accessory equipment in radio, machine shop, hangars and personnel, which will be demanded in the natural course of progress.

Admittedly, climatic conditions have much to do with suc-Admittedly, climatic conditions have much to do with successful aerial navigation. In this particular Los Angeles and vicinity are unexcelled. The average wind velocity is four miles an hour. Electric disturbances are almost unknown and the city enjoys 75 per cent. of possible sunshine. There is no severe cold and no snow except in the highest mountains of southern California. These fine climatic conditions have been recognized by the United States Government in the establishment of its permanent fields. There is an army balloon school at Arcadia an aviation school near Riverside and a great at Arcadia, an aviation school near Riverside and a great aerial training camp at North Island, San Diego. The freedom from storms, the infrequent rainfall and equable temperature are recognized as compelling factors in the successful operation of aircraft in these Government establishments.

While we may assume that there will be a great development in aerial navigation on the part of the civilian populait seems assured that the Government will go ahead with an elaborate aerial program in connection with its Army and Navy departments. Los Angeles is important strategically, which would lead to the assumption that aeroplanes, dirigibles, captive balloons, as military and naval instruments will be



The business center of Los Angeles, Calif., as seen from an aeroplane

nautics, War Department, and those of other countries, Los Angeles may well be expected to make tremendous strides in the near future in aircraft advancement, for various reasons.

Among these may be enumerated:

Its importance as the greatest city in the Pacific Southwest, its equable climate, its strategic location, its proximity to the army aeroplane and aviation schools, its nearness for the great oil-producing regions, its adaptability as a base for the aerial charting of unmapped areas, its location with respect to immense forest reserves, its position as the center of a vast playground for the wealthy leisure class.

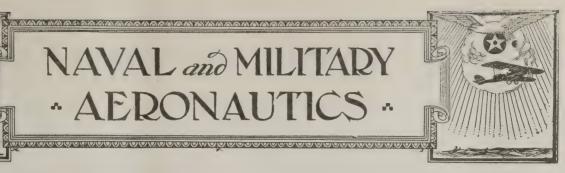
The position of Los Angeles as ninth city in population in

utilized to the fullest extent. Aerial coast patrols for observa-tion and protection, convoy of merchant and naval vessels, the prevention of smuggling and filibustering, the guarding of the great city aqueduct and arteries of electric power come well within the province of aerial fleets.

Los Angeles being the central point in relation to the aviation fields and balloon school and the metropolis of southern California, makes it the logical point of supplies for aircraft equipment. The Government already has located its general aviation supply station in the city. This point being the center of oil production is important.



# NAVAL and MILITAI **AEDONAUTICS**



Air Service in Chief of Staff's Annual Report

Washington, D. C.—General March washington, D. C.—General March makes this reference in his Annual Report to the air program during the war: "In May, 1917, when the plans and policies for our military effort were in a very formulative stage, the French authorities requested that the United States under requested that the United States undertake a tremendous part in aerial warfare by sending 4,500 American aviators, and a correspondingly great amount of material to France within a year. In the Aviation Section of the Signal Corps there were approximately thirty-five officers who could fly elementary planes; there were no officers who had had training or ex-perience with fighting ships. Furtherno omcers who had had training or experience with fighting ships. Furthermore, there were no fighting ships, no commercial industry for the production of the vast amount of aerial equipment required, and the aeronautical engineers in the country were neglible in number

in the country were neglible in number.
"Urged by popular enthusiasm, the
Aviation Section of the Signal Corps
undertook an air program entirely disproportionate to a properly balanced Army and, as events showed, impossible of execution. The history of this transcendental program which was adopted and undertaken by the Signal Corps practically independently of the rest of the Army, affords an early and a striking example of the necessity for a General Staff to formulate the military program and to co-ordinate the activities of the various agencies concerned. Such co-ordination was not, in the case of the air program, effected during the first year of the war

Eighth Balloon Company Ordered to Border

Washington, D. C.—The Air Service of the army on December 4 announced that the 8th Balloon Company, commanded by Lieut. Byron T. Burt, one of the winners of the recent army and navy balloon race, has left Brooks Field for Camp Birnie, El Paso, Tex., to organize the first army airship station on the Mexican border. Just as soon as the hangar which is being constructed is finished one of the twinconstructed is finished one of the twinengine dirigible airships recently acquired by the army will be placed in service and extensive experiments made in border patrol work

### Gaubert, French Ace, Arrives

New York, N. Y.—Lieut. Louis Gaubert, the French ace who is credited with downing the second German plane sent to ing the second German plane sent to earth in the war, using an infantryman's rifle to accomplish the feat, recently ar-rived here from France. Lieutenant Gaubert is credited with 7,900 hours in the air, which is believed to be a world's record. He also holds the record for the greatest number of machines tested as a test pilot, and has gained the reputation of being a "safety first" pilot with only one machine smashed during his long career as a flier. He has come to this country as a demonstrator for the Farman passenger plane which is to be built here for American buyers.

### Daniels to Request \$3,000,000 for Lighter-Than-Air Craft

Washington, D. C.-Secretary iels has had estimates prepared which he will lay before the House Committee on Naval Affairs asking appropriations of \$3,000,000 for lighter-than-air ships. The Navy is prepared to build one or more dirigibles of an improved type should funds for material be provided. There is funds for material be provided. There is considerable sentiment among Navy officers for a policy of original development and a strong belief that in design and construction the Navy is capable of turn-ing out the largest and most advanced type of dirigible without going to school to the builders of these ships overseas. The contract for a ship of the R-34 type, for which Congress appropriated \$2,500,-000, has not yet been let to the English builders

### Crowell Urges Centralized Air Control Before House Committee

Washington, D. C.—Assistant Secretary of War Benedict Crowell, in testimony before the House Committee on Military Affairs, on December 4, again urged the centralization of all aeronautic activities under one separate head.

Mr. Crowell strongly advocated government aid in the development of commercial aviation and suggested that the following aviation activities be united in a single air department:
1. Aeronautic research and experi-

mental work of the classes that have a general application in all organizations utilizing aviation, commercial as well as governmental.

2. Supply of aircraft material for all governmental branches that use aircraft.

3. General training, namely, that kind of practical and theoretical aeronautic in-struction which is common to all branches of the government employing aviation personnel.

4. Supervision of all matters relating to commercial aviation which require federal guidance and encouragement.

### Navy to Transfer Planes and Engines to Aerial Mail Service

Washington, D. C.—Secretary Daniels has informed Congress that 217 aeroplanes and 448 engines owned by the Navy are to be sold, and that fifty De-Haviland fours and 100 spare motors are to be transferred to the Air Mail Service. The Secretary said that the Navy owned 1,797 planes, 168 balloons, 17 dirigibles and 4,057 motors. Ninety-eight new planes and 79 engines are being built for the Navy, the Secretary said.

### Key West Naval Air Station Must Be Abandoned

Washington, D. C .- The land at Key West which was loaned to the Navy Department for use as an aviation station during the war by the Florida East Coast Railroad Company must be given up by the Navy at the end of the fiscal year. In consequence of the railroad's wishes the Navy will be compelled to remove its equipment, which was installed at a cost of more than a million dollars, before June 30, 1920. It had been represented to the railroad company that with profit to itself in mail, passenger and freight receipts the company might allow the development on this field of the proposed overseas aviation venture which was to connect Florida with Cuba, a most promising pioneer overseas aerial transportation enterprise, and that its assured success would be of great benefit to the cause of aeronautics. The company, however, has not yet announced a change of



The armored Salmson biplane, with 240 Salmson engine. The engine, pilot and observer are housed in an armored cock pit



### FOREIGN NEWS



### Considerable Freight Carried by Cross Channel Air Lines

Considerable Freight Carried by Cross Channel Air Lines

London.—In the week ending November 12 Handley Page carried
20 passengers in the London-Paris service, and freight 779¾ lb. A
week of fog, wind, rain, and snow interfered with the service and,
owing to the inclement weather, it was not possible to carry the increasing number of passengers who are taking advantage of the speedy
three-hour journey to the Continent. On several occasions the machine
started from Hounslow fully loaded, but had to turn back at the Channel after ineffective attempts to penetrate low clouds and fog.

On the London-Brussels line during the same period 10 passengers
and 2,969 lb. of freight were carried. It is only of recent days that
restrictions on the carrying of goods to Belgium have been removed,
but since that period large quantities of freight have been carried.
Ladies' dress forms a large part of the cargo; crepe de chine tea-gowns,
boudoir caps, feathers, and furs being amongst the goods recently flown
across the Channel in the freight holds of the Handley Page aeroplanes.

### A British Aero Exhibition

London.—Arrangements have now been made to hold an important International Aero Exhibition at Olympia, London, in July, 1920. It promises to be the largest and most comprehensive display of aircraft, aircraft engines and their components that have ever been brought together, and should be of particular interest as it will be possible to show something of the post-war developments in aeronautics. Every type of machine for every variety of purpose will be represented, and, in conjunction with the indoor exhibition, it is hoped to be able to make provision for trials and demonstration flights at an aerodrome within easy distance.

Before the war a successful series of aero exhibitions was held by the Society of Motor Manufacturers and Traders at Olympia, the first being held as long ago as 1909. Owing to the growth of the British aircraft industry during the war the aircraft firms have formed a separate body, the Society of British Aircraft Constructors, which comprises in its membership every British manufacturer of aircraft, aircraft engines and their component parts, accessories and materials, and this body has entered into an agreement with the Society of Motor Manufacturers and Traders under which the pre-war aero exhibitions will be continued under the joint management of the Aero Societies.

### Fokker to Visit U. S.

Fokker to Visit U. S.

The Hague.—H. G. Fokker, the aeroplane manufacturer, has arrived in Amsterdam, a fugitive from Germany, after the confiscation of his property in Germany because he refused to pay a tax of 14,251,000 marks. Mr. Fokker designed the Fokker combat plane which gave Germany the advantage in aerial fighting in the early phases of the war. Regarding the radio controlled aeroplane, Mr. Fokker stated: "In 1916 the army authorities asked me if I could make a very cheap air plane, with a very cheap engine, capable of flying about four hours, which could be steered through the air by wireless waves.\* They intended to load each one of these aeroplanes with a huge bomb and send them into the air under the control of one flying man, who would herd them through the sky by wireless like a flock of sheep. He would be able to steer them as he pleased and send them down to earth in just exactly the spot he selected.

"The German idea was that it was a tremendous waste to send shells through the air by means of explosives. Their idea was to put all their explosives into the shells and then move the shells to their destination by gasolene power. They had really lost faith in the use of the big guns. The Big Bertha, which fired shells seventy-five miles on to Paris, was probably partly intended to delude the Allies into believing that the Germans were developing their big guns instead of preparing to discard them; and if they had not, in characteristic German fashion, got tangled up in their own red tape they would have rendered the big guns useless before the armistice came."

### Keystone Tire Lands Half Million Dollar Order by Aeroplane

London.—In order to secure a huge contract for tires, it was necessary for Yves De Villers, the Keystone representative, to reach London from Paris in a few hours. It was a case of outwitting certain competition and Mr. De Villers knew if he could reach London within a certain time, he could close the order. He engaged one of the fastest aeroplanes that flies between the two cities, put his sample tires aboard and in less than six hours made the trip from Paris to London and back, returning with a \$500,00 order covering about fifteen thousand Keystone tires.

### Portuguese to Study Naval Aviation Here

Lisbon.—Three officers of the Portuguese navy are en route to the United States to study naval aviation at Pensacola, Fla. Decision to send the officers was reached by the Portuguese government during the visit at Lisbon of Lieutenant-Commander Read, after crossing the Atlantic in the record-making flight.

### Henry Deutsch de la Meurthe, President of the Aero Club of France, Dies

Paris.—Henry Deutsch de la Meurthe, oil king, motorist, balloonist and aviator, died here on November 24. He recently presented the Aero Club of France, of which he was president, the sum of 1,000,000

and aviator, died here on November 24. He recently presented the Aero Club of France, of which he was president, the sum of 1,000,000 francs.

With a vast fortune at his command, he early interested himself in automobiling, both as an industry and for pleasure and sport, and at the exposition of 1889 he presented to President Carnot one of the first vehicles ever made propelled by a petrol engine. He was one of the founders of the Automobile Club of France, chief patron of the great automobile road races in that country, and the founder of various rich prizes for the encouragement of the industry and sport.

Ballooning also attracted his generous attention. He founded and was president of the Aero Club, greatly encouraged ballooning, and particularly the construction and navigation of dirigibles, and gave the prize of \$20,000 to the balloonist who, setting out from St. Cloud, should first, within an hour, sail around the Eiffel Tower, a prize which was won by Santos-Dumont in 1900. He also gave a prize of \$14,000 for dirigible ballooning, and, with M. Archdeacon, gave a prize of \$10,000 for ballooning, and one-half that amount for the first balloon voyage from France to England. He built and gave to the French Government the monster dirigible City of Paris.

Finally he turned much attention to mechanical aviation in heavier-than-air machines when its practicabilty began to be demonstrated. Tenyears ago he founded at St. Cyr, with an endowment of \$100,000, the Aerotechnical Institute of the University of Paris, and in July lash he gave to the Aero Club of France \$400,000 for the organization and promotion of competitions in aviation. His services to France and to the world during the war were inestimable in promoting both the automobile and aeroplane branches of the military establishment.

He was an officer of the Legion of Honor and a commander of the Corder of Isabella of Spain, and a member of many of the chief sporting and other clubs. He was an accomplished composer of music, and founded a number of prize

### Blackpool-Manchester Service Ends

London.—The Blackpool, Southport and Manchester service, conducted during the summer by the A. V. Roe Company, was discontinued on September 30 after 194 out of 222 flights were accomplished. No flight was interrupted by mechanical defect. The total mileage of 8,730 was flown.

### 100 Vickers-Vimy Planes Sold to China

London.-It is announced that 100 Vickers-Vimy biplanes have been sold to the Chinese Government for commercial purposes.

### Wanted: Aerial Station Masters

Paris.-The "Service de Navigation Aérienne," Avenue Rapp, Paris, require, for 1920, twenty-five aerial station masters. They will be selected by a competitive examination, and must have the following qualifica-tions: (1) They must have served in the army; (2) they must have a good general education (university matriculation or analogous diploma).

The examination will be on the following subjects: (a) General aero-nautic knowledge (theory and practice), (b) French (they must be able to draw up a clear and methodical reto draw up a clear and methodical report), (c) the following sciences (arithmetic, algebra, trigonometry, geometry, mechanics, electricity, geography and free-hand drawing). Those who pass this examination will take a course at Bourget for a month in aerial administration, repairs of alteraft, etc. The examination takes place this week. The examiners were appointed by the S.N.Ae. The pay will be 700 to 1,100 francs a month.



Captain Gathergood's Napier engined Airco machine, which won the 137-mile race at Amsterdam by averaging 145 m.p.h. There were 35 entries



# ELEMENTARY AERONAUTICS

### MODEL NOTES

By John F. McMahon



An Inexpensive Monoplane Powered with a Stock Motorcycle Engine Designed by J. F. McMahon

THE model aeroplane while useful, instructive and worthy of consideration, has its shortcomings and must be set aside in order to permit us to proceed with the more difficult but interesting aeronautical problems.

difficult but interesting aeronautical problems.

As the present aeroplane is beyond the reach of the average person because of the fine workmanship and costly materials that enter into its construction, the writer attempts from time to time, to offer to the readers of Aerial Age an aeroplane that can be built by a person of limited means having but a fair knowledge of mechanics, and but a small place such as a cellar or garage in which to construct it

place such as a cellar or garage in which to construct it.

The expense can be kept low by doing all the work from the raw material to the finished product, or labor can be saved by buying finished parts direct from an aeroplane supply house. A few dollars expended now and then for parts as the work on the machine progresses is not noticed and before one knows it the machine is completed.

The machine shown in the accompanying drawing is unique and original in many ways. It is built of few parts, as all turnbuckles, internal brace wires, metal fittings, etc., are not needed in the construction of the body. The wings are braced by two steel tubes on each side. The rear tubes are movable and connect the rear spar to the stick control. This causes the wings to warp when used to correct any movement of the machine laterally. The warping wing method of control is used because it allows light wing construction. Alierons increase the weight of a wing because an extra spar must be included the same length as the ailerons to which must be fastened the movable ends of ribs and trailing edges. That portion of the ribs included in the ailerons would have to be heavier as well, all of which tends to increase weight. The warping wing method is the better of the two. Some readers might say that a constant warping of the wings might weaken them. This might be the case if the machine were heavy and needed a tremendous force to move the wings when controlling the aeroplane laterally. This machine is

so light that a slight twist of the wings will have the desired effect. It is well to remember that every bit of superfluous weight must be done away with if the machine is to be a success.

The writer spent days developing a proper combination that would permit flight with a motorcycle engine—first the biplane, then the monoplane would be used in every conceivable way until the present design was selected as the one offering a fair promise of success. The biplane had too much resistance which, with the small amount of engine power available, made it a doubtful proposition. The monoplane can be only a certain size because of structural difficulties, a large spar necessitates strong wing beam, and a small spar would not have enough lift. However, the result is a good-looking, well-balanced machine that should fly with any make of motorcycle engine.

The machine should weigh about 200 lbs. when completed. It will have a landing speed of 35 miles per hour and a flying speed of between 45 and 50 miles per hour.

speed of between 45 and 50 miles per hour.

The U. S. A. No. 1 wing curve is used. This curve has a high lift to drift ratio which is desirable in a plane of this type, and is generally selected for fast machines. The surface area is 100 square feet.

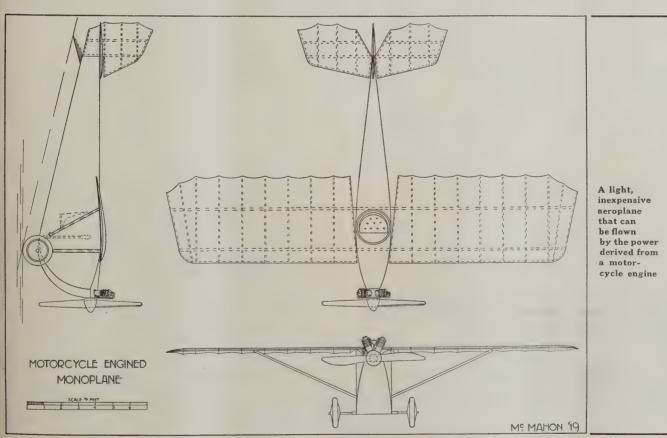
a high lift to drift ratio which is desirable in a plane of this type, and is generally selected for fast machines. The surface area is 100 square feet.

The tail and rudder are hinged and balanced to insure quick action for directional horizontal control as fixed areas as stabilizers and fins have a certain amount of damping effect, making small machines sluggish. This is also true in relation to warping wings.

relation to warping wings.

Full information regarding construction of the body, wings, tail rudder, landing gear and motor mounting will be published in succeeding issues of AERIAL AGE. By all means follow the instructions carefully and do as directed, or failure will result. Many amateur aeroplanists when building planes say, "Well, I will let this go as it is; a little weight here will not matter." No, not if that were the only place, but if it is done in one place it is likely to occur in others, and the result will be that the completed machine will be many pounds over what it was originally intended to be

pounds over what it was originally intended to be.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

### You Can't Win

If the A. E. F. homecomer wears a decoration, everyone asks how he won it, says "Stray Shots." If he doesn't everyone asks why he didn't win one.

If he says he likes French girls, he is untrue to American girls. If he says he doesn't everyone says he is concealing

If he kicks about the Government he is ungrateful. If he praises it he is looking for a soft job.

If he says the Germans fought bravely, he is a traitor. If he says they were cowards he gets no credit for beating them.

If he is promoted it is a sign that he's a "hand-shaker." If he is not he is not ambitious.

he is not he is not ambitious.

If he grumbles about his treatment in the Army nobody listens to him. If he praises Army life nobody believes him.— Army and Navy Journal.

### How and Why

It must be wonderful, she said, To soar up in the sky, To see the earth from up above Where clouds go floating by.

He told her of the stunts he did Of the loop and barrel-roll, And her admiration so increased That it nearly filled her soul.

But he did not tell her all the truth About each daring feat, And why so many flying men Can do their stunts so neat

### MAYOR HYLAN'S SKY COPS.



Frueh in the New York World.

But the fact is, gentle maiden,
That the man who wears the wings
Thinks not about the danger But he thinks of other things.

Straight flying is monotonous And risks you often take Are just a simple method To keep yourself awake.

-Cornell Widow.

### "Up In the Air"

I've been up in an aeroplane, This proves I've gotten back again.

For if I'd landed in a jam, How could I send this telegram?

'F I hadn't gotten back all right, You'd read it in our "Daily Light." '

I simply bet my life just once, That I was all kinds of a dunce.

And I admit now just for fun, The biggest bet I ever won.

'Twas just like riding in a chair, No damage done but to the air;

We tore a great big hole in that, Thought "durn the hole!" as there I sat.

Now Mamma dear, and Junior, too, I've just one thing I beg of you.

I've done the stunt—please say "Amen!" I'll promise not to go again.

'Tis not but that I'd like to go, But that I know you'd worry so.

I may take just one other trip, If my old sinner "foot don't slip,"

And when I reach the Pearly Gate, On schedule time (you can't fly late),

St. Peter'll ask (mongst other things), "Why! Angel Alba, where's your wings?"

Then I'll reply to him in rhyme, Why, Pete, you're way behind the time!

We've moulted all that feathered stuff, Too risky—wasn't sure enough—

Too slow-it loses lots of time, To make the trip with wings, sublime,

So, if to you it's all the same, We're coming now by aeroplane."

I only hope he don't say "go!!! And take a tail spin down below." Lovingly,

Daddy.

# A United States Naval Officer Says:

The engines on the C-5 are the most economical built. They have recently undergone some wonderful tests in Washington, and it was found that this type motor is almost impossible to wear out."

—Not builting

The C-5 holds the world's record for non-rigid airships for a non-stop long distance flight.

UNION GAS ENGINE CO. DAELAND, CALIFORNIA





the usefulness of aeroplanes for observation purposes and for fire control in the present state of development of aeronautics far outweighs their effectiveness as implements of direct attack upon enemy forces. In such matters, however, it must never be forgotten that we are at the very beginning of possible developments; indeed, the air armament actually used in the war is now practically obsolete, and machines were in the process of perfection when the armistice came, and undoubtedly others will be rapidly devised, which will necessitate even more radical modification of military practice than those already in use. The aerial bomb, either controlled by wireless from a mothering consort, or under gyroscopic control from the point of release is already a practical implement. Such bombs, carrying very large quantities of high explosives and having no pilot whose safety is involved, could even now be launched, travel with remarkable accuracy a predetermined route and, by wing collapse at a predetermined distance, effect wide destruction. It

the most elemental ethical and humanitarian grounds, then

lapse at a predetermined distance, effect wide destruction. It is at least a possibility upon which serious men are thinking, that such bombs may some day replace heavy guns and make obsolete the whole practice of building long-range artillery which must either be fired from fixed emplacements or is at best moved with slowness and difficulty from place to place.

The uses and possibilities above described are, however, all essentially military and, so far as land operations are concerned, are merely an extension into the air of the modes of attack, counter-attack, and defense land armies are accustomed to use. In their nature, they depend upon land forces for their preparation and control, and in some part upon the land forces for defense even against enemy air attack. Moreover, the particular services rendered by aircraft so far are to lend knowledge to the operation of land forces with which they are in cooperation, and those who realize the extent to which victory in warfare depends upon concentration of the control of combined operations will perceive the seriousness with which any proposal must be viewed which undertakes to separate services which must be so instantly knit together when the time for action arrives. No body would think of suggesting that artillery should be a separate service, or cavalry, in any other sense than that they should have their experts giving special attention to their development, but all the time in immediate cooperation with

The American-French Aero Exposition, Inc., announces that it has purchased

### International Aircraft Advertising Agency, Inc.

15-17 West 44th St., New York

Suite 803-804

Telephones Vanderbilt 7686-7642

Cable Address: AMFREX

### MR. ADVERTISING MANAGER:

Word to the Wise Dropped from the Skies

The great Trans-Continental Air Race represented millions of dollars worth of potential advertising. It was an augury of what is going to happen to-morrow on a commercial scale.

A big national advertiser will put one of the biggest advertising coups over when the first commercial liner jumps from New York to San Francisco, if he negotiates an arrangement to have a thousand aerial messages dropped over every important city enroute. We have scores of suggestions as to how this should be done, and we are closely in touch with the projected plans for Trans-Continental air trips, and the possibilities of utilizing them for aerial advertising.

Furthermore, there are scores of exhibition and passenger carrying services organized throughout the country that we can link up to your advertising department. Just tell us your business and we'll map your plan.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to Aerial Routes in the United States furnished on application.)

he other services and under the control of a single command. Nor would temporary control, asserted merely for the purpose of combined operations, be enough. The whole purpose of military training and discipline is to inculcate a series of habits of cooperation and obedience which will leave is little as possible to be learned when the hour of trial comes. The uniform, the spirit of membership in the Army, the followship of constant association, the experience of constant association and the constant association association and the constant association association association and the constant association and the constant association associati he fellowship of constant association, the experience of constant cooperation, the knowledge which each arm of the service has of the functions of the other arms of the service, he ways they fit into, supplement, and support one another, he extent to which they can be relied upon, all form parts of the material of success, and that commander has the best army whose men from top to bottom realize the extent to which the performance of duty by each is the predicate upon which the successful performance of others depends.

For these reasons, it would seem unfortunate to have an ndependent military air service, to be brought into cooperaion with a land army either for particular or general operaions, and the analogy of joint land and water operations against seacoast emplacements is not helpful, as there can be no such intimacy or correlation between the land and the seas as there is between the air and the land. It is plainly petter for the military air service to be military, to have its soldiers and its officers trained in the same school of discipline and trained together as often as possible with the men of the land trained together as often as possible with the men of the land army, and to have, wherever possible, interchange petween the two so that each will feel in the most intimate possible manner its relation to the other. To separate them makes them rival services with the whole train of evils which such rivalry creates, evils which in peace time mean conten-ion before Congress for unbalanced appropriations, griev-ances and fretfulness about relative rank and rapidity of proances and fretfulness about relative rank and rapidity of pronotion, and in time of war the substitution of combined serrice prides for a single emotion of pride in one service.

These very obvious considerations, however, by no means

These very obvious considerations, however, by no means exhaust the subject, for the aeroplane presents not only the possibility of military usefulness, but the prospect of civilian isefulness to which at present we have not the means of setting any limit; and there are some primary facts about he production of aeroplanes which enter into this problem with commanding force. In the first place, aeroplanes are very expensive. Their initial cost is high and apparently always will be; because of the peril involved to those who rery expensive. Their initial cost is high and apparently always will be; because of the peril involved to those who

operate them they must be constructed of the best and most carefully inspected and selected materials, and by the most highly skilled, and therefore highly paid, mechanics. They are frail, easily injured, costly to repair, and rapidly worn out, and these qualities seem more or less permanent; so that even if relatively stabilized types were devised and the maximum economics of quantity production obtained, they would still be extremely costly as compared with other means

would still be extremely costly as compared with other means of transportation and other military equipment.

In the second place, the art is new. Its development requires concentration of inventive genius and stimulus to invention. The cost of experimentation on a proper scale is beyond the reach of private means. A really progressive aeroplane industry in the present state of the art can not be maintained except with the Government as a prospective purphaser and if the sole purpose for which the Government maintained except with the Government as a prospective purchaser, and if the sole purpose for which the Government makes appropriations is the development of war machines, the commercial possibilities of aircraft will be neglected, which would be a detriment both to the general industrial progress of the country and to the Army itself, since the Army has an interest very real, if more remote than its immediate military interest, in having available for its use the most highly developed agencies of transportation to be used as a supplement when unusual speed is required or difficulties otherwise insurperable are to be overcome.

Third, if military aviation is to attain its maximum development, it should be as a specialized branch of a general practice; that is to say, ideally considered, flying should become a very common thing, with large numbers of men trained in the elements of the art and in its daily practice, with landing fields conveniently placed about the country and mechanics and facilities for repair accessible practically everywhere. In this cituation, an emergency would find the country In this situation, an emergency would find the counwhere. In this situation, an emergency would find the country able rapidly to recruit its air forces by taking into the military service those who in the practice of the art generally had shown special aptitude and fitness, and it would be necessary to add only the military training and special knowledge of military aeronautics. For obivous reasons, no country can train and maintain in time of peace such a number of aviators as it would need immediately upon the outbreak of hostilities, and it would greatly expedite the increase of the air force if the Army could find, ready to its hand, a great number of partially trained men.

(Continued on page 346)

### **JONES**



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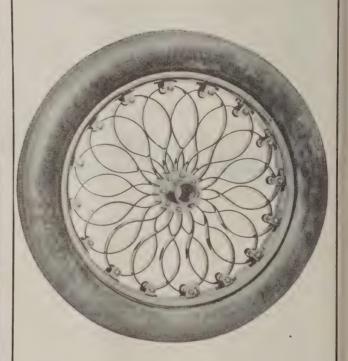
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# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington	350	miles
Washington to New York and return (four times)	450	miles
Washington to Dayton and return		
(two times)		
return	. 400	miles

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States-it set a new milestone in the aeronautical history of this

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

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(Continued from page 343)

It seems to me clear, therefore, that the development of aeronautics must depend upon national patronage and support; that if we are to have an industry ready to produce military aeroplanes in large numbers rapidly in the event of need, such an industry will have to be built up in time of peace and maintained at least to the point from which rapid expansion is possible without the delays necessarily incident to the inauguration of new industrial enterprises and the training of entirely new organizations for production. It seems clear, too, that the industry must to a certain extent be under national control, as must flying itself be under national regulations. Even if it were profitable, private enterprise could not be given a free hand to develop and manufacture aeroplanes to sell them freely as articles of commerce, imposing upon the purchaser the whole responsibility for the use he makes of his purchase. There must be regulations which will require training before men can be permitted to navigate the air and expose to peril both themselves and the lives and property of others over whom they may fly. Laws of the air, like laws of the road, must be made and enforced. All of these look to Federal regulation and control.

The answers, therefore, to the questions involved in the future of the air service are not simple, and dognatism is out of place. Just how far the national interest will justify Congress in making appropriations for experimentation and for the maintenance of the aeroplane industry, how concentrated in time these appropriations should be made, what agencies of development and control should be organized, the extent to which centralization would be helpful, are all questions to which the answers of enthusiasm and of doubt are alike open to objection. A sound national policy, however, would seem to involve a generous attitude on the part of the Congress in the matter of appropriations, recognizing the commercial possibilities of the aeroplane by encouraging its use in the Postal Service, and of course recognizing its tremendous importance both to the Army and the Navy. Having determined how far these various possibilities justify support, an aggregate appropriation might be made to be expended under the direction of the President upon the advice of a board of which the Secretary of War, the Secretary of the Navy, the Postmaster General, and the Secretary of Commerce would be members. Such a board would inevitably consider the special needs of the military and commercial

interests and would watch from day to day the developments of the art as it promised greater usefulness in one or the other direction.

By such cooperation of the special services, an interchange, if not a direct pooling, of engineering could be effected, and ultimately training could be arranged to be given to civilian aviators in the same schools and with the same facilities as are used in the early stages of the training of military and naval aviators. Such a board could appropriately advise the President upon the matter of flying regulations, and the President could in turn bring legislation to the attention of Congress

By the use of the aggregate fund thus placed under the President's general direction, encouragement to the extent of the funds available could be given to the industry, and the orders for Government account so placed as to maintain as extensive facilities as possible for the rapid production of specialized types of aircraft in the event of emergency. Such a board could also bring into the field of its general study and operation the manufacture and use of lighter-than-air craft, and it may be worth while here to observe that with the quantity production of noninflammable gas the possibilities of the rigid and dirigible balloon are in many ways as promising as those of the aeroplane. As the Chief Executive, having under his constant care the commercial and industrial development of the country as well as the national defense, the President would undoubtedly cause himself to be advised from time to time as to the best distribution of jurisdiction in this field, and by assigning to the Army and Navy the functions which can best be performed by them, respectively, and by bringing to a common view the needs of the military establishments and of commerce, the best results could be obtained.

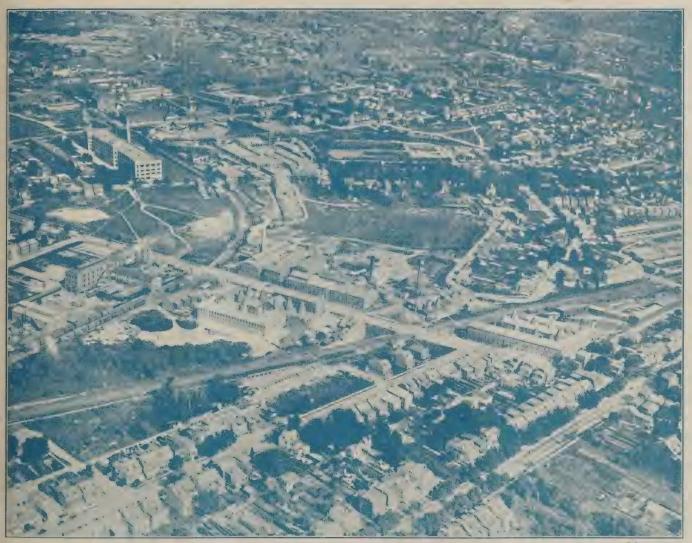
On the whole case, it seems quite clear that the time has not come to set up an independent department of the air, there being as yet no commercial use nor likelihood of the commercial use of the aeroplane which will prove profitable enough to maintain the industry, and certainly no such prospect of independent effectiveness of aircraft as an agency of war to justify reliance upon it to the detriment of the traditional military arms. As a matter of fact, in war, as yet, the infantry is the backbone of military effort, and all other arms on land, on the sea, and in the air, are mere aids to its advance and protections to it while it is performing its functions of advance and occupation.

# ALRIAL AGE WEEKLY

ol. 10, No. 10

**DECEMBER 22, 1919** 

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An Aerial View of Trenton, New Jersey

C Ledger Phot

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Are Sold

SHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY iption: Domestic, \$4. Foreign, \$6. Entered as second-class matter March 25, 1915, at the Post Office at New York under the act of March 3rd, 1879



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Major R. W. Schroeder established a world's altitude record with a passenger at Dayton. Ohio. on October 4th. climbing to 31.800 feet with a LePere Biplane. equipped with a Liberty motor. fitted with a supercharger and 8-G spark plugs.

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THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., December 22, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, DECEMBER 22, 1919

NO. 10

### SELLING AEROPLANES AS AUTOMOBILES ARE SOLD

Alabama Concern Sells 78 Aeroplanes—Chicago Concern Sold 150 Planes in Six Months— New York Aces Sold 200 Imported Planes in Three Months

DDITIONAL reports showing that the demand for aircraft for civilian purposes is large enough to support the aircraft industry on a permanent basis, and that aeroplanes are being bought to-day as automobiles are bought, have been received by the Aero Club of America and

the Aerial League of America during the past week.

The Curtiss Aeroplane and Motor Corporation has advised the Aero Club of America that the Curtiss-Johnson Airplane Company, of Montgomery, Ala., distributors of Curtiss aeroplanes and flying boats for the State of Alabama, have purchased seventy-eight Curtiss JN-4D planes from the Curtiss IN-4D planes from the Cu

tiss Company for sale to private purchasers.

Mr. H. James Levy, a Chicago automobile agent, advises that he undertook to sell aeroplanes a few months ago while waiting for deliveries of automobiles and sold 150 planes and could actually have sold more if he had been able to

get delivery on same.

A small fortune in selling imported aeroplanes has been made by a group of British and American aces who formed a corporation a few months ago called the Interallied Aircraft Corporation with offices at 185 Madison Avenue.

The officers of this corporation include Colonel William

The officers of this corporation include Colonel William A. Bishop, the famous ace of aces, who had seventy-two enemy planes to his credit, president of the corporation; Lieutenant Colonel Wm. G. Barker, who brought down sixty-eight enemy planes, who is first vice-president; Major Reed G. Landis, second ranking American ace, who is second vice-president; Lieutenant Charles H. Payne, U. S. N., manager; Captain W. R. Lott, the Canadian ace, secretary; Ensign J. W. M. Richardson, U. S. N., treasurer; and Lieutenant Stuart McDonald, U. S. A., assistant manager.

These aces formed this corporation several months ago when they found that American manufacturers could not

when they found that American manufacturers could not when they found that American manufacturers could not supply the increasing demand for aeroplanes. They arranged to import to the United States aeroplanes of famous makes like the "Sopwith" and "Avro" machines. They readily obtained the financial backing necessary from New York bankers to purchase 2,000 British machines, and Colonel Bishop went to Europe to arrange the purchase and to supervise the shipping, while the other members of the firm attended to the selling end. Within a month after the formation of the company they had received prospective orders for close to 500 aeroplanes, and as the shipping strikes in English close to 500 aeroplanes, and as the shipping strikes in England prevented the shipping of machines to the United States, they bought fifty second-hand training machines from the Canadian Government which the company sold to waiting customers

The shipping conditions having improved during the past month, it was possible to get shipping space for a few of the British planes and four Avros and two Sopwith biplanes arrived during the past week and eight more are due next week. Colonel Bishop who is supervising the shipping has found it impossible to get the necessary space to ship in large quantities, so he is shipping as many as he can on every ship coming to the United States.

The Interallied Aircraft Corporation has over 500 prospective customers waiting eagerly for the arrival of these planes which are of the two and three-passenger type equipped with 110 h.p. LeRhone motors. One of the planes which arrived last week is a "Sopwith Dove" biplane which was used by the Prince of Wales and Colonel Barker when they were flying in England a few months ago. One of the aims of the Interallied Aircraft Corporation is to sell aeroplanes for aerial touring, pleasure, sport and transportation at popular prices.

Another pioneer aeronaut who has already made a small fortune in selling aeroplanes is Captain Horace B. Wild, who

has been active in aeronautics since 1906 and built and operated some of the earliest dirigibles and aeroplanes the United States. A few months ago Captain Wild advertised that he had several second-hand aeroplanes for sale. In response to his advertisement he was flooded with prospective orders and he decided to organize a corporation at Lincoln, Neb., and bought a lot of 200 second-hand training planes from the Army and spare parts and Hispano-Suiza motors. Most of these machines were sold before he could actually get deliveries from the Army and he and his associates netted a small fortune from their enterprise.

These reports of extensive sales of aeroplanes were not included in the report made to the Aero Club of America and the Aerial League of America by the commission which investigated the business prospects for the aeronautic industry in forty-nine cities and which pointed out in its report that the aeronautic industry lost \$50,000,000 in orders during the past year because aircraft manufacturers were not in a position to make deliveries.

The officials of the Aero Club and the Aerial League of America are urging the manufacturers to organize them-selves on a business basis so as to be in a position to supply the large demand for aeroplanes not only in the United States but also in South and Central America which they believe will amount to at least \$50,000,000 during the coming year. They point out the opportunity presented to aircraft manufacturers and dealers for Latin-American business and from individuals at the coming Third Pan-American Aero nautic Congress, to be held at Havana, Cuba, from February 21 to March 1, 1920.

The Cuban Government has invited the Latin-American

and European countries to send delegations to attend the congress, and the countries have advised that they will send congress, and the countries have advised that they will send special aeronautic commissions to Cuba which will be authorized to place orders for aircraft as most of these countries are planning to establish extensive aerial mail services and to use aircraft to solve other difficult questions of transportation due to their limited railroad facilities.

Every facility will be afforded to manufacturers to show and demonstrate their products. The aircraft exposition will be held at the "National Theatre" which is located in the heart of Hayana and an opportunity will be afforded.

the heart of Havana and an opportunity will be afforded to demonstrate the aircraft and motors by actual flying

demonstration at the Havana Airport. Arrangement has been made with the Cuban-American Jockey Club for the use of the race track at Havana, which adjoins the Airport so that spectators will witness demonstrations of aircraft from the well appointed race track which will afford them every con-

The sum of \$25,000 has been offered for prizes for con tests and exhibitions to be held during the congress, and owing to the practical nature of these contests, manufacturers will be able to demonstrate the efficiency of their aircraft and motors.

### ENGLAND TO SPEND \$75,000,000 A YEAR FOR MILITARY, NAVAL AND CIVIL AERONAUTICS

Construction of Large Airships Stopped-Over Two Hundred and Fifty Aviation Fields Returned to Cultivation

Right And, following the example of the United States, France and Italy, has cut down her air program considerably, but her appropriations are still much greater than the appropriations allowed for the U. S. Army, Navy and Post Office, although the actual number of squadrons planned for the British military and naval establishments are surprisingly few.

The high figures for so small a number of aero squadrons are explained in the statement that a large sum is to be spent in establishing aerodromes in the colonies and is, therefore, to be spent on general aerodrome buildings, construc-

it is noted with regret that the British Government has abandoned the project to build large dirigibles and that the dirigibles of ten million cubic feet hyrogen capacity may not be constructed.

Also that over two hundred and fifty military aviation fields have been turned back to cultivation during

helds have been turned back to cultivation during the past six months, although we appreciate that owing to her small size England is forced to utilize all the land available for the production of food.

Winston Spencer Churchill, who at present is both Secretary of War and Air Minister, in charge of Military and Naval Aeronautics, has prepared a plan for the Royal Air Force organization in peace time based on the expenditure of £15,000,000 (\$75,000,000) yearly. The main outlines of

this plan, which was announced on December 13, provide for

this plan, which was announced on December 13, provide for one flight squadron for each division of the army to cooperate with the troops in all stages of their training, besides three general service squadrons, and also one or more squadrons for co-operation with the artillery.

The fleet will have permanently three aeroplane squadrons and two seaplane squadrons. India will have eight service squadrons, Mesopotamia three and Egypt seven, while the naval bases at Malta, in the eastern Mediterranean and probably Alexandria, will each have one small seaplane unit.

A report dated November 6, made to the House of Com-

A report dated November 6, made to the House of Commons by Major General Seely, of the British Air Ministry, stated that the Air Ministry had given up, since the signing of the armistice, 252 aviation landing grounds as follows:

- (a) Stations consisting of land only (i. e., landing (h)

Also regrettable is the decision of the Air Ministry to dispose of the dirigible stations, including the East Fortune Station, where R-34 was stationed when it started for the historic transatlantic flight.

### AMERICAN AEROPLANES TO BE USED IN AERIAL TRANS-PORTATION LINES IN JAPAN, CHINA AND KOREA

ABLES received from Japan by the Aero Club of America, from the commission which is organizing the First Aerial Derby Around the World, advise that American aeroplanes are to be used in aerial transportation lines in Japan, China and Korea.

Some of the planes to be used are to be purchased and shipped to China by a New York banker.

The commission, which includes Commodore Louis D. Beaumont, member Board of Governors, Aero Club of America; Major Charles J. Glidden, president Aerial Touring Association and vice-president Aerial League of America, and Benjamin Hillman, left for Japan on November 3, after touring the United States organizing committees in forty-pring ing the United States, organizing committees in forty-nine cities to arrange for entries for the Aerial Tour Around the World and receiving of competitors who may land in those

The cable dispatches received by the Aero Club from the commission state that they received hearty receptions on their landing at Yokohama and then on their arrivel at Tokio.

their landing at Yokohama and then on their arrivel at Tokio. At Yokohama the commissioners were guests of the American-Japan Society. His Royal Highness Viscount Kunihi-Koho presided and addresses were delivered by prominent Japanese officials, including Viscount Ishii, former Ambassador to the United States, who heartily endorsed the Round the World Derby and pledged unlimited co-operation.

The American Ambassador received the commission and other prominent Americans in Tokio pledged their hearty

co-operation.

The pioneer work of the commission in mapping air routes across the Pacific to Japan is outlined in the following dispatch issued by the Associated Press on December 15:

The American commission of the first aerial derby around the world has arrived in Japan and is now engaged in making preparations for the Japan stage of the flight. The commissioners, Commodore Louis D. Beaumont, Major Charles J. Glidden and Benjamin Hillman, are being entertained and are actively at work consulting the Japanese authorities continuity. cerning the flight preparations.

"On the way across the Pacific the commissioners com-pleted the charting of the trans-Pacific routes, making the distance from New York to Yokohama by way of Seattle,

Alaska and the Aleutian Islands, 8,229 miles, by way of San Francisco and Honolulu, 8,420 miles, and by way of San Francisco direct, 7,525 miles. This charting is subject to confirmation. Tentative routes around the world will vary from 24,173 to 28,086 miles.
"The commission has pointed out each country will be per-

mitted to make its own ruling for flights over its respective

territories.

The route of the commission, subject to changes and including the first leg of the trip through the United States, already covered, is to be as follows:

To	Miles	Total
From New York, tour of United Staes, to		
San Francisco	14.670	14.670
Yokohama, Japan		19.370
Seoul, Corea		20,482
Mukden, Manchuria	479	20,961
Dalaina China	1/9 4 110	
Peking, China		21,479
Shanghai, China		22,387
Hongkong, Hongkong		23,287
Manila and return		24,517
Bangkok, Siam, via Saigon	1,400	25,917
Singapore, Singapore	860 2	26,777
Side trips in China, Japan and Corea	1.223	28,000
Batavia, Java		28.532
Borneo and Sumatra		29.064
Penang		30.594
Colombo, Ceylon	1,204	31,858
Rangoon Burmah, Madras, India		32,858
India	3,000	35,858
Port Said, Egypt, Italy, France and other		
Mediterranean countries, Syria, Jerusa-	2000	
lem,, etc., etc.		38,858
Norway, Sweden, Denmark, England, etc	4,000	12,858

Other countries bring the total to be covered by the com-

mission up to approximately 50,000 miles.

The commission is sending weekly reports to the Aero Club of America and the Aerial League of America of the aeronautic interest and status of civilian aeronautic interest in each country.



### THE NEWS OF THE WEEK



Eagle Makes Climb Record

In order to demonstrate the adaptability of the Curtiss Eagle, eight-passenger ity of the Curtiss Eagle, eight-passenger limousine, for work in high altitude localities, Bert Acosta, chief pilot for the company, on Thursday made a test flight at Mineola, climbing 6,500 feet with four passengers and 768 pounds of gasoline. The demonstration was made for a prospective customer who is contemplating the purchase of an Eagle for passenger-carrying work. According to Acosta, the machine is capable of climbing to and machine is capable of climbing to and operating at an altitude of 10,000 feet.

Several inquiries have been received by the Curtiss Company concerning the Eagle—an engineering concern desiring the use of a machine of the carrying capacity of the Eagle to transport construc-Nevada Mountains. High powered aero-planes, capable of carrying a half-ton load, will facilitate the work, especially in the saving of time, as the location of the work is in a country where muledrawn vehicles only can operate at the present time.

Record Purchase of Aeroplanes

The Curtiss-Johnson Aeroplane Company of Montgomery, Ala., distributors of Curtiss aeroplanes and flying boats for the State of Alabama, have placed the largest order for planes ever made in America by a private concern. The company has purchased seventy-eight Curtiss JN-4D planes from the Curtiss Company for sale to private purchasers. The company has also enlarged its territory, taking over the States of Georgia and South Carolina, in addition to Alabama.

U. S. Aero Club Men Invite Prince for

Conference
Paris, December 11.—A delegation of the Aero Club of America, composed of Augustus Post, William F. Hogan, George F. C. Wood and I. F. Campbell, conferred to-day with Prince Roland Bonaparte, president of the International Aeronautic Federation, and extended to Aeronautic Federation, and extended to him a formal invitation to attend the annual conference of the federation in 1921, to be held in the United States.

The proposed aerial Derby around the world, the rules for next year's competition for the James Gordon Bennett Aviation Cup race and other contests were

discussed.

Ruth Law, the American aviatrix, went up in a 300 horse power, three mile a minute machine yesterday afternoon and performed several "stunts" over the Villacoulay Aerodrome.

English Novelist Flies Over New York

Florence Thackeray, the English writer who is in America gathering material for a book, recently had the novel experience of escorting the Prince of Wales upon

the occasion of his departure from New York. It was her first flight in a modern aeroplane. She made the trip in a Curtiss JN-4D, piloted by Richard H. Depew, former instructor and test pilot in the U.S. Air Service.

National Advisory Committee Makes

Annual Report to President
Washington, D. C.—Encouragement by
Congress of the development of commercial, as well as military aviation, was urged by the National Advisory Committee for Aeronautics in its annual report today to President Wilson proposing adoption of a continuing program of aircraft construction to assure a nucleus of industry capable of expansion to meet needs in an emergency.

Recommending immediate steps to encourage foreign trade in aircraft the committee suggested that a special mission be sent to South America to create markets for American-made machines. The committee also advised that the Government regulate civil aerial navigation and en-courage cities in the establishment of

landing fields.

Senate Committee Reports New Bill Washington, D. C.—The Senate Mili-tary Affairs Committee has reported favorably on the bill presented by Senator New providing for a separate Department of Aeronautics. The vote was nine to two.



American ACES urge Congress to establish a separate department for aerial activities. The sub-committee of the House listened to the views of Army ACES, naval fliers, aeroplane builders, designers and others on the subject of creating a separate department for aeronautics. Recommendations included the establishment of a National Flying Academy, subsidies to manufacturers, and preliminary training of Army and Navy fliers under the same system. First row, from left to right: Rep. Fuller, Rep. Olney, Rep. La Guardia, Rep. Morin, Rep. Hill and Major Haslet, Second row: Colonel Archie Miller, Lieut. A. Scott, Major William Coker, Lieut-Com. Bellinger, Lieut. T. H. Dolan, Colonel H. Reynolds, Captain J. Healey, Captain W. R. Lawson. Third row: Major C. Biddle, Major R. A. Ford, Major J. Meissner, Captain B. Wright and Glenn L. Martin

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Senators Hitchcock of Nebraska and Fletcher of Florida, Democrats, voted against the measure on the ground that it would complicate the Governmental machinery and increase costs of operation

The bill, which has been opposed before the committee by both Secretaries Baker and Daniels, would place the department under the direction of a chief of the air service who would be appointed by the President with the Senate's approval, and would be a member of the Cabinet at a salary of \$12,000 annually. The department would have control of the air services of the army and navy, the Post Office Department and other Government departments, and would be charged with the development of the science of aeronautics, both commercially and from a military standpoint.

### First Aeroplane Highway Inspection Made

Atlantic City, N. J.—The first aerial highway inspection ever made was completed by Earle Ovington, pioneer aviator and President of the local Curtiss Flying Station in a Curtiss MF Flying Boat. A representative of the Daily Press acted as observer. Ovington piloted the seaplane up and down eight times over the new Absecon Boulevard, while below the Freeholders and their official party formally inspected the route in automobiles.

The aerial inspection, made from a 2,000-foot altitude, gave a novel and spectacular touch to the ceremonies, attracting widespread comment from the officials for the very up-to-the-minute method

of viewing a new road.

Personal Par

Lieut. W. L. Perley, formerly of the Bureau of Aircraft Production, Washington, D. C., has been made assistant to C. S. Rieman, president and general manager of the Elgin Motor Car Corp.

### Baker Appoints Board to Draft Aerial Regulations

Washington. A committee has been

appointed by Secretary of War Baker, at the direction of the President, to draft regulations covering air navigation in the United States. The committee is composed of: Col. J. F. Curry, representing the War Department; Comdr. J. L. Callam, Navy; Capt. S. V. Parker, U. S. C. G., Treasury; W. C. Carpenter, State Department; Prof. C. F. Marvin, Agriculture; Otto Praeger, Post Office Department; Dr. S. W. Stratton, Commerce Department; John D. Lennon, Labor Department, and Joseph S. Ames, National Advisory Committee.

### Parachute Jumper to Drive a Liberty Plane in the Future

Charleston, S. C.—H. R. Cruikshank, who executed the jump from the Liberty plane of William Staley at the fair and landed safely with his parachute, has joined the Liberty Flyers and will learn to drive one of the planes. Mr. Cruikshank back in 1912 drove a pusher plane, but since then he has been engaged principally in parachute jumping from balloons

The jump from the aeroplane on Saturday was the first time that Mr. Cruikshank has ever attempted to execute a drop from a plane. The parachute was tied to the landing gear of the machine and when the plane left the ground Cruikshank was in the seat behind the driver. When 4,500 feet in the air, he climbed from the seat under the machine to the landing gear, attached the life belt and cut loose the ropes and dropped.

### Poland Mourns U. S. Ace

London.—A movement is afoot to enter in Poland's Hall of Fame the name of Lieutenant Edmond P. Graves of the American aviation squadron, who was killed at Warsaw on November 22. Thousands attended his funeral, according to a private telegram received here, and Miss Dorothy Huntington, of London, fiancee of Lieutenant Graves, has received a message of sympathy from the Polish naval attache here. Lieutenant Graves was killed while participating in

a celebration in honor of Brigadier-General Joseph Pilsudski, formerly military dictator of Poland.

### U. S. Aces Still in Service

Washington.—Nine of the sixty-eight "aces" developed by the United States Air Service during the war still are connected with the service, an official report showed. These expert flyers, all of whom had five or more air battle victories to their credit, include Captain Field E. Kindley of Gravette, Ark.; Captain J. O. Donaldson, Washington, D. C.; Major Reed M. Chambers, Memphis, Tenn.; Captain H. Weir Cook, Toledo, Ohio; Captain Martinus E. Stenseth, Twin Valley, Minn.; Captain James A. Healy, Washington, D. C.; Captain Clayton L. Bissel, Kane, Pa.; Captain Arthur R. Brooks, Framingham, Mass., and First Lieutenant Harold H. George of Niagara Falls, N. Y.

### Air Department is Urged By Five Aces

Washington. — Five American aces credited with having brought down more than fifty German aeroplanes advocated before a House subcommittee the creation of an Aeronautical Department of the Government to coordinate all aerial activities. The group included Capt. "Eddie" Rickenbacher, officially credited with twenty-seven air victories in France; Major Charles J. Biddle, Philadelphia; Capt. F. E. Kindley, Gravette, Arkansas; Major J. A. Meissner, Brooklyn, and Capt. J. A. Healey, Washington. All asserted that the air forces in France would have been much more efficient if administered by a department of aeronautics.

nautics.
Glenn L. Martin, Cleveland, veterau aeroplane designer and builder; J. K. Robinson, Greenwich, R. I.; Col. H. L. Arnold, San Francisco; Col. Archie Miller, Washington; Capt. Walter R. Lawson, Langley Field, Va., and Lieutenant-Commander P. N. L. Bellinger, commander of the NC-1 during the transatlantic flight, also expressed their views.



The aeroplane in which Captain Ross Smith, the Australian aviator, landed in Australia on Dec. 11 after making the flight from England, thereby winning the fifty thousand dollar prize offered by the Australian Government for the first flight from England inside of thirty days.

Captain Smith made the flight in two days less than the maximum time allowed



Bill to Give Commerce Secretary Air Control

Washington.—Regulation of air navigation in the United States by an interdepartmental board, whose rules would be enforced by the Secretary of Commerce, is proposed in a bill to be presented to Congress by the special board appointed by the President last October.

The proposed board would be authorized to promulgate regulations for air navigation, including establishment of minimum altitudes for flight over cities, of prohibited zones in the vicinity of military establishments, and the setting up of proper service and signalling systems.

The Secretary of Commerce would be charged, in effect, with the duty of policing the air. Pilots and crews of aircraft would be licensed by the department.

Air Service to Sell Aeroplane Linen Washington, D. C.—The Material, Dis-posal and Salvage Division of the Air Service will sell 60,000 yards of aeroplane Additional information can be secured at the District Bureaus of Aircraft production located at Buffalo, Chicago, Dayton, New York and San Francisco.

Consolidates Executive Offices and

On December 10th the Norma Company of America, manufacturers of Norma" Precision Bearings, moved its factory from the Bronx, New York City, to Anable Ave., Long Island City, N. Y., where a modern four-story reinforced concrete building has been acquired. Under the new arrangement a largely in-creased factory space is secured, making possible the increased output of "Norma" Bearings necessitated by the growing de-mand for these high-precision units. The mand for these high-precision units. new plant is being rapidly equipped with the special machines needed for precision manufacture, and the full capacity will be available shortly. The executive offices at 1790 Broadway have been consolidated with the factory at the new address.

Rules for Air Navigation

Washington.—Regulations of air navigation in the United States by an interdepartmental board, whose rules would be enforced by the Secretary of Commerce, is proposed in a bill to be presented to Congress next week by the special to the Provident Land of the Congress of the Secretary of Commerce, is proposed in a bill to be presented to Congress next week by the special to the Provident Land of the Congress of the Secretary of t cial board appointed by the President last October to draft some form of regula-tory legislation. The board is comprised of representatives of the War, Navy, Post Office, and Commerce Departments.

The proposed board would be authorized to promulgate regulations for air navigation, including establishment of minimum altitudes for flight over cities, of prohibited zones in the vicinity of military establishments, and the setting up of proper service and signaling systems to promote and facilitate commer-

cial flying especially.

The Secretary of Commerce would be charged in effect with the duty of policing the air. Pilots and crews of aircraft would be licensed by the department under the requirements prescribed by the board, with revocation of license and other penalties provided for violation of rules. The primary design of the proposed regulation, it was said, is to promote the safety of the flier and the pub-

lic as well.

Florida An Aviation Center

Florida promises to be the center of viation activities during the coming months for, with the opening of the famous winter resorts, many aviators are heading their machines southward. Avia-tion companies, as well as private owners, are focussing their activities upon the Everglade State, and, as a result, aviation should receive a great stimulus in that portion of the United States.

Following a custom inaugurated three years ago, the Curtiss Aeroplane and Motor Corporation has announced the reopening of its flying school at Miami, Florida, after a temporary suspension of activities due to the war and to the leasing of its fields to the U. S. Marine Corps. E. H. Ballard, former general

manager of this school, will again be in charge of operations.

#### Aerial Patrol Charting Coast

Air routes between New York and Boston and as far south as the Carolinas are being charted by the Atlantic coast patrol of the United States Army Air Service, according to Colonel Archie Miller, commanding the Mitchel and Hazelhurst fields on Long Island.

The army fliers in six De Haviland and four bombing machines, with twelve De Haviland and four bombers in reserve, are to continue all winter 'cross country work, general map making, course charting, and reporting ships in distress at sea. The latter feature will be accomplished by means of wireless equipment installed in the patrol planes. The radio also will be used in case the fliers need to summon assistance.

Colonel Miller said the fliers were giving an excellent demonstration of how an army aeroplane and pilot may be utilized to advantage in time of peace. observer accompanies each De Haviland Each machine, he said, has an increased gas-carrying capacity. The First Aero Squadron was organized and trained at Kelly Field, Texas, shortly after the outbreak of the war and later was sent overseas, where it saw much active service.

Extension of the service to include mapping of aerial routes on the Atlantic seaboard and later the middle Atlantic states, is said to be in contemplation. At present, while one-third of the First Aero Squadron personnel is out on patrol work, the other two-thirds are resting. All flights are non-stop between the home. field and the destination, thus putting the pilots under a system as rigorous in point of training as they experienced during the war. Aviation experts have attrib-uted the efficiency fo American pilots in France to the fact that they were compelled to fly at regular intervals and, consequently, did not have time to forget their training.



A new type of French aeroplane, the Vuibo. Note its unusual and pleasing lines

Albert S. Burleson, Postmaster General Otto Praeger, Second Assistant Postmaster General B. Corridon, Superintendent, Division of Aeral Mall Servce Louis T. Bussler, Chief of Maintenanice and Equipment J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M. Miller Lawton V. Smith E. Hamilton Lee E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T .Lewis Walter H. Stevens Herbert M. Crader Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton
Robert H. Ellis
James H. Knight
Elmer G. Leonhardt
Paul S. Oakes
Paul W. Smith
Frederick A. Robinson
Max Miller
F. A. Nutter

#### Newark Postal Field Opened

Newark, N. J.—The Newark terminus of the Aerial Mail System was inaugurated on December 6. The landing field is known as Heller Field. A crowd of 2,000 persons witnessed the arrival of the first plane, bearing 1,000 pounds of mail from Washington. Two hours later the mail plane from Cleveland arrived.

The machine from Washington was one of the new twin-engined Martin mail planes. It was piloted by Walter H. Stevens and made the trip from Washington to Newark in 1 hour and 58 min-

utes.

The tract of land was turned over to the Government for use as a flying field free of rental. An appropriation of \$25,000 was made by the citizens of Newark to clear the property of 1,200 trees and as many more stumps.

No fences have been erected or ropes stretched for the protection of observers.

Mail arriving at Heller Field will be transferred at once to awaiting trucks, which will haul it to the railway station in Newark, three miles away, where it will be put aboard a train for New York.

As heretofore, the mail for Cleveland, Chicago and the West will leave at halfpast six o'clock in the morning, and for Washington and the South at nine o'clock.

An immense concrete and corrugated iron hangar has been erected on the field for the accommodation of the Air Mail Service aeroplanes. It is 200 feet long by more than 100 feet wide, affording room for storing about ten machines at one

Charles W. Frenning, who has been manager of the Belmont Park Field, will be in charge of the Heller Field, with about eighteen men under him.

There are twenty-one aeroplanes in use in the Air Mail Service in the Eastern division. Ten of them are Curtisses, three Martins and eight DeHavilands. In the pilot force of the division are fifteen men, twelve of them regulars, three extras. Seven of the men are stationed at Newark, two at Washington and four at Cleveland. The service is at present two men short.

#### Twin-Engined DeHaviland Carries 30,000 Letters

All load-carrying aeroplane records were broken on December 2 when a twin motor DeHaviland 4 plane, devised by and manufactured for the Post Office Department, covered the distance between the air mail field at Washington and that at Belmont Park, New York,—a distance of 218 miles in 1 hour, 34 minutes, with a mail load of nearly 30,000 letters weighing 630 pounds. The speed was at the rate of 138 miles an hour. The best president record was on Soutember 10, when vious record was on September 19, when a single motor DeHaviland carried 300 pounds of mail from Washington to New York at a speed of 123 miles per hour and the third best record was on October 1 when a Curtiss plane carried 348 pounds from New York to Washington at a speed 118 miles per hour.

The twin-motor DeHaviland was piloted by Samuel C. Eaton, Jr., of Philadelphia, Pa., and left College Park at 11 A. M., arriving at Belmont Park at 12.34 P. M. The time of flight included two circles around the field for altitude before setting out on his course and was the first trip made by the plane in a regular carrying of the mail. This plane is perhaps the only twin-motored plane built in the United States which not only maintains the altitude under full load with one engine but actually climbs on one engine. In the opinion of the postal authorities it is the greatest forward step made in the development of a small weight-carrying plane. It eliminates the fire hazard by having the engines in the wings and away from the gasoline supplies and also it minimizes danger to the pilot for the same reason. The twin-motor DeHaviland is a distinctive product of the postal service being outlined personally by the Second Assistant Postmaster General Otto Praeger.

The plane will enable the Department salvage several hundred thousands of dollars worth of DeHaviland 4 war planes and parts as well as Liberty motors, the power plant being two six-cylinder Libertys of 200 H.P. each of which can be constructed almost entirely out of one 12-cylinder, 400 H.P. Liberty. The plane can carry nearly double the mail load that is carried by the single motor DeHaviland.

# 186 Miles An Hour Made By DH-4 Mail Plane

Washington, D. C.—The record made on December 4 by the twin-motored De-Haviland 4 plane, rebuilt for the Post Office Department, on her maiden mailcarrying trip was even more remarkable as to speed than the first details revealed. as to speed than the first details revealed. While her average for the 218 miles was 138 miles per hour, leaving Washington at 11 A. M. and arriving at Belmont Park, N. Y., at 12:34 P. M., the last 90 miles of her trip between Philadelphia and Belmont Park was made in 29 minutes or at the rate of 186 miles per hour.

Pilot Eaton took advantage of a strong wind at an altitude of 4,000 feet which he maintained and where he found the wind

maintained and where he found the wind velocity steady. A mail load of nearly 38,000 letters or 630 pounds was carried.

#### Postoffice Department Tests Jahn Parachute

Washington, D. C.—The first official postoffice test of the Jahn parachute mail delivery apparatus was held on December

13 at the city postoffice.

A large Glenn-Martin mail plane flew from College Park, Md., to drop the mail sack for the test. At 11 o'clock the big plane swooped down from behind the postoffice building, and banking around a sharp turn, released the mail pouch with its supporting parachute. The umbrella-like contrivance opened immediately and slowly descended without any apparent

#### Aeromail Three Days to Coast

Washington.—Further details of the posed extension of the aeroplane mail service to the Pacific coast and to Atlanta and establishment of the new line between St. Paul, Minneapolis and St. Louis within the next year were given to the House Post Office Committee on December 11 by Assistant Postmaster-General Praeger.

With the new lines in operation, Mr.

With the new lines in operation, Mr. Praeger said, the deliveries of New York-Frisco mail would be speeded up two days and the Atlanta-New York mail

by twelve to fourteen hours.

An appropriation of \$3,000,000 for continuation and extension of the mail service was requested, but the committee deferred decision.

# THE PROPELLER TESTING LABORATORY OF THE ARMY AIR SERVICE AT McCOOK FIELD

By F. W. CALDWELL Aeronautical Engineer, Air Service, U. S. Army

HE Army Air Service has put into operation at McCook field a propeller testing laboratory that is believed to be the most powerful and complete plant of its kind in the ld. The existence of this laboratory and the scope and character of the work done there are almost unknown among aeronautical engineers and others interested in the aeronautical industry. This is primarily due to the necessary connautical industry. This is primarily due to the necessary con-servatism which has governed in making public military

activities during the war.

The purpose of this article is to give a description of the laboratory equipment and of the scope of the tests that are

carried out there.

This plant was erected in order to safeguard the experimental propellers against the possibility of failure in the air and at the same time to make tests of pormising inventions

Serious propeller failures have been so rare with the Army during the last two years that many persons do not realize the damage that is usually caused by them. The fact that these accidents have been so rare is largely due to the policy

of not allowing any propeller to go into the production until the design has been standardized. This process always in-cludes a destructive whirling test of at least one propeller of the design made of the wood which is proposed for production. The test given is an overload test, the amount of over-load and the endurance of the test being varied at the discretion of the engineering department; for most wooden

ascretion of the engineering department; for most wooden propellers, however, a test of ten hours at an overload of 50% is sufficient to insure an ample factor of safety.

Anyone who has seen the results of a bad propeller failure need not be told of the effect. It is only necessary to imagine an unbalanced centrifugal force of 30,000 pounds resulting from the loss of one of the blades; with this centrifugal load changing its direction with each revolution it is only a matter of god fortune if the whole machine is not wrecked.

In designing this testing laboratory a number of sources of power were considered. At the start we laid down the following specifications for the design: (1) the plant must be capable of developing a maximum power of not less than 1,200 horse power; (2) it must be provided with an accurate



The four Sprague testing dynamometers



The jackshaft being lowered into place

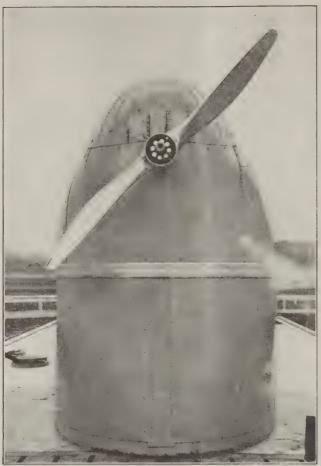


Fig. 3. Propeller test rig showing a propeller in position for test. Note the observation slots in the floor below the propeller

speed control up to the maximum speed of 3,000 r.p.m.; (3) provision must be made for accurately weighing the thrust and torque; (4) a bombproof must be provided for catching the flying parts of broken propellers and the bombproof and the base of the power plant must be arranged in such a way as to minimize the interference with the flow of

air through the propeller; (5) provision must be made for an observation chamber protected from the flying parts; (6) suitable equipment must be provided for measuring the deflection of the propeller while it is turning.

A number of different ways of furnishing the power for the operation of the propeller shaft were investigated. The steam turbine offered the objection that a large steam boiler equipment was required and the horse power delivered could be only approximately estimated from the bowl pressure. The alternating current electric motor did not offer satisfactory speed control. No standard type D. C. electric motor of this power and speed could be located and we were assured that considerable trouble with commutation would be encountered with a direct current motor of such high speed. Direct current motors of lower speed were available and estimates were obtained on gearing to step the speed up. The time required for delivery was considered impractical.

Meanwhile it was found that a number of Sprague dynamometers rated at 200 to 300 horsepower were available. These machines can be run at 200 horsepower continuously if proper cooling is provided, and can be run for a few minutes at 300 horsepower.

The Sprague machines offered all the advantages of great speed range, accurate control, and accuracy of power measurements. Furthermore, the Sprague machines, being of smaller diameter, could be streamlined in such a way as to interfere as little as possible with the propeller blast. It was found that sufficient power could be obtained by the use of four of these machines in a row.

The arrangement of the four Sprague machines can be seen in Fig. 1. This photograph taken during the course of

The arrangement of the four Sprague machines can be seen in Fig. 1. This photograph, taken during the course of construction, shows the concrete supports for the motors and the framework of the concrete housing. At the right hand end of the picture is shown the massive foundation of the jackshaft pedestals. The motors are joined by Francke couplings of ample size. These couplings have given no trouble whatever.

Figure 2 shows the jackshaft being lowered into place. This jackshaft is a six-inch nickel steel shaft. This size and material have been found necessary to withstand the shocks imposed by a suddenly breaking propeller. To further reduce the shock a shaft extension is provided. This extension is bolted onto the shaft end by means of four 5%-inch bolts. These bolts are drilled out inside to 5/16 inch. If a propeller breaks near the hub on one blade the unbalanced centrifugal force breaks the bolts and the shaft is not injured.

The archlike bombproof shown in Fig. 2 is being used as a crane. It is provided with wheels and a track and serves to move any of the motors or parts when required. The manner in which it serves as a bombproof is more apparent in Fig. 3. In this figure also may be seen the observation slots which

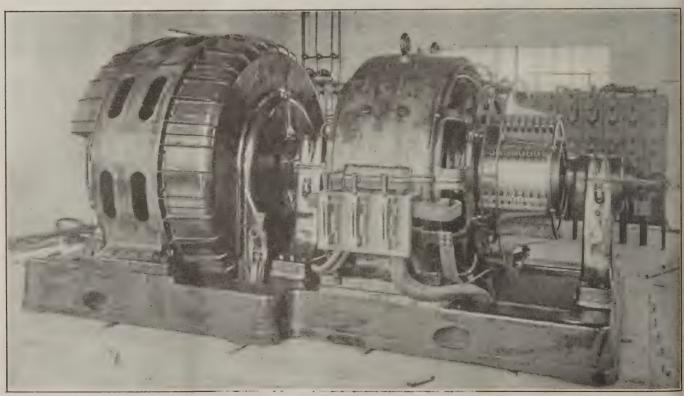
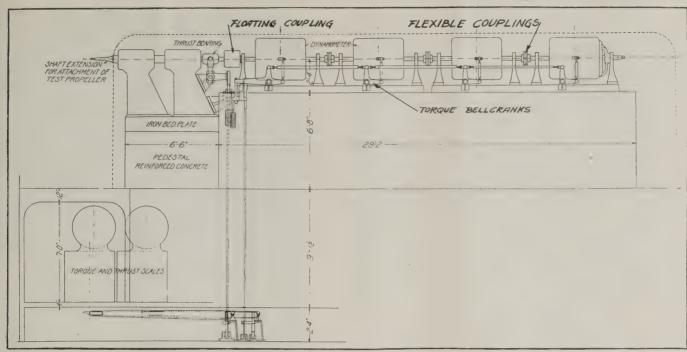


Fig. 4. The 1000 K. W. Westinghouse generator set



Principal members and dimensions of the dynamometer with torque and thrust recording system

lead down to the observation chamber. In order to avoid the possibility of broken particles flying through these slots into the observing room, observations are always taken on the side of the axis where the propeller blades are moving upward. On the other side the slots are covered with a piece

of boiler plate.

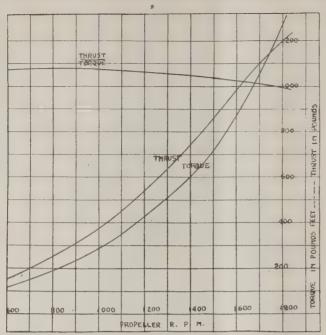
As the bits of broken propellers fly out almost exactly in the plane of revolution it was not found necessary to make the bombproof very wide. At the right of the picture in Fig. 2 can be seen the brick power house. This contains the motor generator set which furnishes direct current and contains a small shop for adapting experimental propellers for testing as well as an office for the engineer in charge of the testing plant. A thorough description of each test is kept

here and it is possible to refer to any past test and find photographs and all details of the test.

The 1000 K. W. motor generator set is shown in Fig. 4. This is standard Westinghouse equipment. The size of this machine is ample and the power is great enough to provide for any probable future requirements in the way of increased size of the testing motors. At the rear of this machine and on the right may be seen the contactors through which the power input to the Sprague motors is regulated. These contactors are operated by means of remote controls which are located in the observation chamber underneath the propeller shaft. The power comes into the station through the cables seen at the center of the picture near the top. Alternating current is furnished by a local power company at 6600 volts. current is furnished by a local power company at 6600 volts.



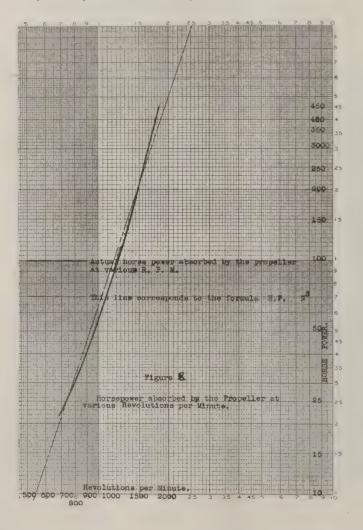
Fig. 6. Torque and thrust dials in underground observation room wi'h dynamometer control switchboard



Characteristics of typical propeller from McCook Field whirling test

The normal voltage of the D. C. generator is 550, but the voltage is varied according to the speed at which it is desired to turn the Sprague motors, as this method is economical of power and the current from the generator is not used for the operation of any other machines

Returning to the description of the testing plant proper a drawing of the principal members is shown in Fig. 5. The flexible couplings between the motors are the well-known Francke couplings, and, being of ample size, they have never required any attention since they were installed



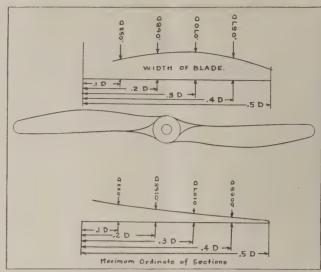


Fig. 9. General shape of propeller used in typical test

The floating coupling between the motors and the propeller shaft acts as a flexible coupling and at the same time must allow the propeller shaft to move axially 34 inch in either direction without transmitting any thrust to the motor shaft. This requirement was so unusual that a new type of coupling had to be designed. The original design gave a little trouble in eliminating all of the thrust; a later design, however, appears to give very satisfactory results.

The scale mechanism was designed and built by the Toledo

The torque is applied to the torque bellcranks (Fig. 5) by means of short links. The torque bellcranks are all tied together by means of horizontal links so that the total load from all the machines is applied to the bellcrank nearest the scales. Here an ingenious device maintains tension in the vertical torque scale rod shown under the floating coupling no matter which way the motors are turning.

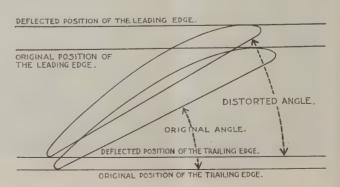
The thrust bearing is a standard Kingsbury bearing and need not be described here. The thrust is transmitted to a bellcrank and again to a vertical scale rod which is maintained in tension regardless of the direction of the thrust.

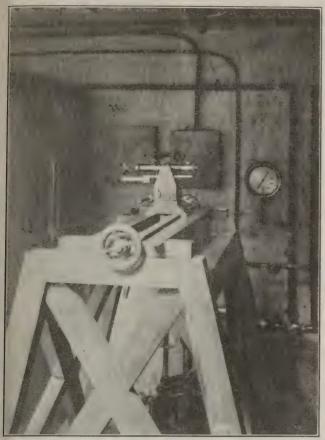
The observation chamber is located directly underneath the propeller shaft and both torque and thrust scales are located in this room. The scales proper are of the indicating type and are shown in Fig. 6. Each scale has a total capacity of 6,000 pounds, the dials being graduated to show 2,000 pounds for one complete turn.

Between the two scales and at the top is an electric tachometer (Fig. 6) which is used to adjust the revolutions approximately. Exact revolution speed is obtained by means of an ingenious electrical counting device designed by one of the testing staff, Mr. Gray.

At the right of the picture (Fig. 6) is the control panel At the right of the picture (Fig. 0) is the country for the Sprague motors. The motors are operated in two motors in series. The parallel sets, each set comprising two motors in series. The two control handles are arranged to permit operation of the two sets either independently or together. The ammeter two sets either independently or together. The ammeter near the top of the panel shows the current of each set and is very convenient for balancing the load.

Just above the scales may be seen the observation slots in the roof of the room. These slots are in the plane of revolution of the propeller and extend all the way across the room. By close inspection of Fig. 11 these slots may be seen at the extreme top edge. At the time this picture was taken



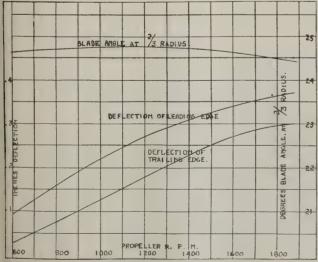


Transit telescope and mirror mounted on sliding bed for observing deflections of propeller speed while running

all of the slots had been provided with felt-lined trap doors in order to minimize the noise in the room. Any of these doors may be opened when an observation is to be made and one of the doors is shown held open in the picture.

The transit telescope shown here serves to give accurate readings of the axial deflection of the propeller blade at any radius. The telescope is provided with a mirror set at 45 degrees so that the revolving propeller may be seen through the slot by looking into the telescope.

The sliding ways on which the telescope is mounted are set up exactly parallel to the axis of the propeller shaft. Thus the telescope is exactly parallel to the plane of revolution of any radial element of the propeller. When the propeller is turning over at idling speed the telescope is adjusted until the cross hair is exactly in the plane of revolution of, say, the leading edge. The position of the telescope is then noted on the scale at the right. When the speed is increased,



Characteristics of typical propeller from McCook Field whirling test

the telescope is again adjusted and the position again noted.

The difference of the scale readings gives the axial deflection.

This value is subject of a correction due to movement of the shaft which has to be measured separately and subtracted.

By measuring the axial deflection of the leading edge and

the trailing edge of a propeller at any point the change in pitch may be obtained by the method shown in Fig. 10.

The present method of measurement gives the average deflection of the two blades. A stroboscopic method is being worked out to give the measurements on the two blades separately.

Another test which is of great practical value is the water spray test: Two views of a water spray test are given in Figs. 14 and 15. It will be noted from these that the water is supplied from an overhead pipe at the top of the bomb-proof. These tests may be made as severe as desired by regulating the amount of water, the speed of the propeller, and the length of the test.

A typical curve of thrust and torque of a propeller as obtained from this rig is shown in Fig. 7.

If the thrust of the propeller were proportional to the square of the R. P. M. and the torque of the propeller were also proportional to the square of the R. P. M., then the ratio of thrust or torque would be a constant. Since the ratio of thrust to torque is theoretically independent of R. P. M., it is considered a good criterion of the value of a propeller as a thrust producer under given conditions. propeller as a thrust producer under given conditions.

By reference to Fig. 7, however, it may be seen that the ratio of thrust to torque decreases after the speed of 1,000 R. P. M. is reached. This corresponds to a tip speed of about 320 miles per hour. This speed probably corresponds to the critical speed for the aerofoil at the extreme tip when working at the corresponding angle of attack. As the velocity is increased the critical speeds of sections nearer the hub are progressively obtained, so that there is considerable lowering of the thrust torque ratio when the speed of 1800 R. P. M. of the thrust torque ratio when the speed of 1,800 R. P. M. is reached. (For explanation of the critical speed of propeller aerofoils, see Article by F. W. Caldwell and E. N. Fales in "Automotive Industries" for August 28, 1919.)

A curve showing the horsepower of the propeller at various

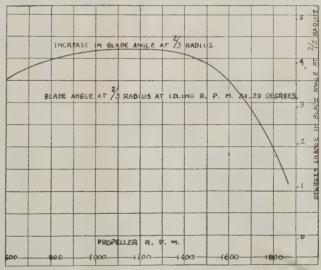


Fig. 13. Characteristics of typical propeller from McCook Field whirling test

R. P. M. is drawn in on logarithmic paper in Fig. 8. cent to this curve is drawn a line representing what the curve would have been if the power were proportioned to the curve of the R. P. M. It will be noted that the horsepower is not proportional to the cube of the R. P. M. In view of our present knowledge of propeller aerofoils, it is not to be expected that the horsepower would be proportional to the cube of the R. P. M.

A typical set of deflection readings for a propeller is shown A typical set of deflection readings for a propeller is shown in Fig. 12. Reference to the curve showing the blade angle at various R. P. M. shows that the angle first increases and then decreases as the propeller is speeded up. This is shown in a more pronounced manner in Feg. 13, where the change in blade angle, referred to the original angle, is plotted against R. P. M. We have assumed that the change from an increasing to a decreasing blade angle is the result of a which is the courter of processors of the perceptile. shift in the center of pressure of the aerofoils.

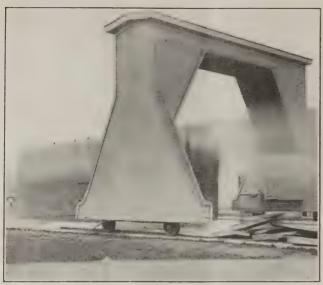


Fig. 15. View of propeller undergoing water spray test looking up stream

The change in angle of the propeller in motion offers some very valuable data to the designer. While the distortion at fixed point undoubtedly differs considerably from the amount of distortion encountered in flight, experiments on a series of different blade shapes have enabled us to draw some important conclusions as to the effect of different blade shapes on the distortion. The results have been particularly useful in connection with the stress analysis of propellers.

The actual destructive tests have covered a very wide field. Tests have been made on various types of propellers, such as automatically variable pitch propellers, adjustable pitch propellers, propellers made of steel, composition propellers,

various designs of wooden propellers, and various methods of constructing wooden propellers from conventional designs.

In an article of this kind it is obviously impossible to cover with any degree of detail the ground of the experiments which have been carried on. It may be said, however, that about two hundred and fifty tests have been made in this plant for the Army and Navy, and that propeller failures in service have been reduced to an extremely small number. At least two inventions, the Micarta Bakelite propeller and the variable pitch propeller, have been developed to a point where they bid fair to become important factors in the aeronautical industry.

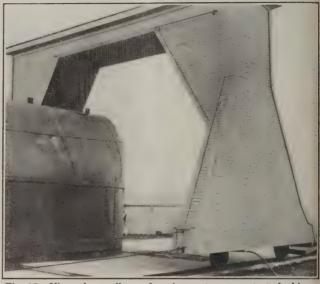


Fig. 15. View of propeller undergoing water spray test; looking

### **Book Review**

The Way to Fly, by Avion. An introduction to flight for beginners. Eight illustrations and 63 diagrams. 12 mo. \$1.25 net. This manual is intended for the preliminary study of those who aspire to become pilots. The volume takes up the mental and physical requirements of the aviator, cost and methods of instruction, the commercial possibilities of aviation, the care of the engine and the aeroplane, how to take off, land, and perform other necessary evolutions, the use and care of instruments, stunt and night flying rules of the air and aerodrome, flying over water, etc., etc. The book is of particular value in preparation for practical instruction.

This book may be purchased from the Aeronautic Library, Inc., 299 Madison Avenue, New York.

Five Years in the Royal Flying Corps.

By Major J. B. McCudden, V.C.,
D.S.O.

This work is an intimate account of life in the Royal Flying Corps during the Great War. The book is well illustrated with excellent reproductions of portraits. The manuscript for this book was completed by Major McCudden a few days prior to his death and was edited by Mr. C. G. Grey, who was able to impart, as a close friend of McCudden's, those little personal touches which make the account so interesting.

This book can be purchased at the Aeronautic Library, Inc., 299 Madison Avenue, New York. Price, \$2.50 net; postpaid, \$2.75.

Gas, Gasoline and Oil Engines, by A. Frederick Collins. If there is anything you want to know about engines, from the barrel of the earliest cannon to the present-day high-powered engines of various types, this volume will answer your questions and tell you many things of which you have never even thought. Some of the subjects the author included in this invaluable book are: The Internal Combustion Engine Simply Explained, the Efficient Engine, Mobile Gasoline Engines, all types, such as the motorcycle, the motorcar, the motorboat and aeroplane engines, the economical oil engine, the Diesel self-igniting engine, etc. Price \$1.35, post paid.

FIGHTING THE FLYING CIRCUS, by Captain Eddie Rickenbacker, America's greatest ace relates in this incomparable volume his thrilling experiences as a flyer during the past World War. Captain Rickenbacker's "Hat-in-the-Ring" squadron (94th Squadron, U. S. Air Service) was the heroic group of fighters who did so much to put the German Von Richtofen's Flying Circus out of business. It will go down in history as the first American squadron to go over the enemy's lines; the first to destroy an enemy plane, and the one to bring down the last Hun machine that fell in the war; and as the only American fighting squadron selected to move into Germany with the Army of Occupation. Read this volume and learn the experiences of this flyer. Price is \$1.65, post paid.

The £. S. D. of Flying: compiled by Arthur J. Swinton.

The author has worked out in this volume the air routes of the future, costs of transit and maintenance, and the conditions generally which will make for the success of commercial Aviation. This book is fully illustrated with maps and several different types of aeroplanes.

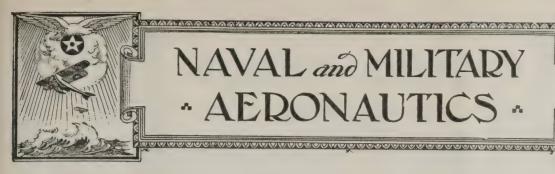
several different types of aeroplanes.

Contents: The Uses of the Flying Machines, A Glance Backward, Elementary Technicalities and Types of Machines, Trade, Geographical and Other Considerations, Private Aeroplanes and Flying Machines, The Permanent Way and Its Cost, The Provision of Flying Stock and Running Costs, Flying Machines and Other Vehicles Compared, The Mails of the World, The State and Flying.

This volume can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, New York City. Price \$1.65 post paid.

pard

Aerial Transport. By G. Holt Thomas. The author is well known as a pioneer in aeronautics, having studied the problems of flight for thirteen years. His book points out that the aeroplane will not compete with existing means of transport but will perform a service which these means cannot do. It supplements, not supplants, them. There are nearly a hundred full page illustrations showing many phases of commercial aerial transport.



# NAVAL and MILITAR \* AEDONAUTICS \*



#### Mitchell Field Again Independent Military Station

Washington, D. C.-Orders issued Nov. 14 direct that Mitchel Field, Garden City, L. I., which has been a sub-field of Hazelhurst Field, be re-established as an indehurst Field, be re-established as an independent military station. Hazelhurst is discontinued as an independent military station and is announced as a sub-field of Mitchel Field. The present commanding officer at Hazelhurst will assume command of Mitchel Field and of all Air Service activities on Long Island, except the U. S. Aeronautical engine plant and the District Office of Procurement at Long Island City. All pilots should note that Hazelhurst and Roosevelt Fields no longer have proper facilities for handling aircraft and those who have occasion to land in that vicinity should do so at Mitchel Field.

#### Lieut.-Commander Reed to Be Promoted

Washington, D. C.-President Wilson recently approved the recommendations of the naval selection board for 31 permanent and 7 temporary captains and 53

permanent and 12 temporary commanders. Lieut. Comdr. Albert C. Reed, commander of the NC-4 on its transatlantic flight, was included in the list for promotion to the temporary rank of commander.

#### Navy Mechanics Transferred By Flying Boat

Rockaway, L. I.—Lieut. A. S. Dietrich and Ensign W. E. Blackwell left the Rockaway Naval Air Station on November 28 in an F-5-L flying boat with four mechanics which were urgently needed at Hampton Roads, Va. The flight was made in five hours. made in five hours.

The custom inaugurated by Colonel W. L. Kenly, then director of the Army Air Service, of demonstrating the usefulness of the aeroplane by utilizing it almost exclusively whenever he had occasion to travel from Washington to any of the fields throughout the East, has been adopted by many of the officers of both the army and navy air services, and it has been extended to include the quick transfer of men and light material from one field to another.

#### Rated As Aeroplane Pilots

Washington, D. C.—Under the provisions of Paragraph 1584½, Army Regulations, the following named officers having completed the required tests are rated as aeroplane pilots: 2nd Lieuts. Samuel P. Mills, Joseph T. Morris, John E. Ups-2nd Lieuts. Samuel ton.

Frederick Bowne, Jr., formerly 1st Lieutenant in the Air Service, Roland G. Blake, formerly Captain Air Service, and Alexander G. Sillars, formerly Second Lieutenant, Air Service, having completed the required tests before the date of their separation from the service by honorable discharge are rated as aeroplane pilots.

#### Air Service Artillery Radio Board Named

For the purpose of recommending methods and policy of training officers of Field Artillery and Coast Artillery in the conduct of artillery fire from aircraft by means of radiophone and radio, a Board of Officers was appointed recently consisting of the following: Colonel James Prentice, Air Service; Colonel William P. Wilson Coast Artillery: Light Colonel P. Wilson, Coast Artillery; Lieut. Colonel Daniel W. Hand, Field Artillery; Lieut. Colonel Follett Bradley, Field Artillery; Lieut. Colonel Lewis H. Brereton, Air Service; Captain O. E. Marvel, Air Service.

This Board of Officers since the date of its appointment, has made recommendations at the following camps, etc.; Fort Sill, Okla.; El Paso, Tex.; Langley

Field, Va.; Fort Storey, Va.; Washing-

Army Orders Military Aerial Scouting and Coast Patrol Washington, D. C.—Orders have been issued from here ordering the First Aero Squadron, stationed at Mitchel Field, Squadron, stationed at Mitchel Field, Long Island, to undertake a series of cross country scouting flights as a matter

of training routine.

Next week the First Aero Squadron, under Major Henry J. F. Miller, will start a series of cross country flights that start a series of cross country flights that will be kept up all the year, so that aviators will be ready at any time and any place required. The flights will take in the South, New England and Middle Western States. The aviators will use DH-4 planes or the 9-B type, and Martin bombers. They will be equipped with machine gups for the training of pilots.

One flight squad will go out each week, while two squads will remain on the ground. Men always will be stationed at posts available for quick action in any part of the country. Six planes will be kept in active flying and twelve on the ground in reserve.

At the same time as the cross country At the same time as the cross country flying is started an aerial coast patrol will be inaugurated. This will be accomplished by the 5th Aero Squadron, under Lieut. Clarence Midcap. The first flight will be from Mitchel Field to Langley Field, Va. The pilots, in the event of a shipwreck, will be required to fly to it and ascertain its trouble, then report by wireless to the nearest station.

There will be an observer in each plane.

There will be an observer in each plane, There will be an observer in each plane, which will be of the DH-4 type, with extra fuel capacity. The planes will leave Mitchel Field on Wednesday and return on Thursday. Four flyers will leave Langley Field on Monday and Thursday, returning Tuesday and Friday. This also will be permanent work.



The latest model of twin engined Gotha biplane bomber, from a German photograph recently received from France



# FOREIGN NEWS



D'Annunzio to Fly to America Via Pacific
Fiume.—In an interview with an Italian newspaper correspondent,
Gabriele D'Annunzio announced that he plans to fly to America via
Japan and the Pacific if Fiume is still an Italian possession. The
plans for the flight to Japan had been laid before the Fiume coup
and have not been changed, with the exception of the trans-Pacific
flight to America at the end. The weather will make conditions
favorable for the flight in February.

Germans Finance Russians by Aerial Transport

Paris.—Aeronautical experts have pointed out often that it is dangerous for the Allies to permit the Germans to build new air machines or to use their powerful old ones unless the Allies limit and control their use. Such fears seem fully justified by a document published by Le Journal. A photograph shows a huge German machine which was captured by the Roumanians in Bessarabia when the machine, which was flying to Russia, was forced to descend because of engine trouble.

The picture in itself is nothing remarkable, except that it shows the size of the machine, which is one used to bomb London during the war. But the contents of its passengers cabin throw new light on the alleged German undertakings with Soviet Russia. The cargo of the machine, which was piloted by two German officers with the aid of three mechanics, included 360,000,000 rubles (normally \$180,000,000), a special press for printing rubles and millions' worth of jewelry.

Among the papers found on board, it is said, were documents which clearly show Germany's intentions in regard to the Entente Powers.

The machine has five engines, each of 260 horse power, and is capable of hauling 40,000 pounds and of flying for several hours without a stop.

Fragile Art Treasures Sent by Plane

Fragile Art Treasures Sent by Plane
Paris.—Public confidence in air transportation has developed to such an extent that consignments of valuables and fragile goods of all kinds are now being sent by air. A prominent art dealer recently received from London pictures valued at \$100,000 and sent to the British capital precious jars of Chinese porcelain by aeroplane.

Such objects were formerly carried by special messengers at double the expense of air transportation.

London.—London plans to have a permanent aeronautical museum which shall cover the whole range of aeronautics practice, history and development, with models of every type of machine used in the war and before. It is hoped to locate the musum in a large building in South Kensington, near the science Museum.

First American Woman Flies Across Channel
London—The first American woman to fly across the English Channel is Mrs. Frank Case and her step-daughter, Margaret. The trip from here to Paris, was completed in one hour and forty minutes.

Reopening of Recruiting for the R. A. F.

Owing to the large number of men who are due for discharge on the completion of their engagements, recruiting for the R. A. F. has now been reopened and there are vacancies for skilled mechanics of various

des. Engagements are for four, six or eight years, with three, six or Ir years respectively with the reserve.

British Aircraft Compeitions 1920

Owing to the representations made by British aircraft manufacturers the Air Ministry has decided to alter the date of the commencemnt of the small type aeroplane competition to the first of June, 1920. Entries for this competition will, therefore, not close until February 1, 1920. The dates already announced in connection with the other competitions will remain the same.

Both of the aeroplane competitions will take place at the Aeroplane Experimental Station at Martlesham Heath, near Woodbridge, Suffolk. The Seaplane (Amphibian) Competition will take place at Felden, with the exception of the tests for landing upon and rising off the ground for this class which will be held at Martlesham.

Japan After Aerial Cruisers

By Karl H. Von Wiegand

Berlin.—Japan is said to be endeavoring to place orders in Germany for the two largest and fastest aerial war cruisers ever designed. According to reliable information, specifications have been submitted for two cruisers, to be fully armed and equipped with bombing apparatus and all the latest scientific machinery developed in Germany during the war. The type ordered is known as the Schuente-Lantz cruiser, rival of the Zeppelin of similar design.

Japan, it is said, is in a great hurry for these cruisers, and in her instructions has laid emphasis upon quickness of construction. The plan is to have the cruisers shipped to Japan in parts. Article CCI of the peace treaty may hold the explanation for the Japanese emphasis on hurry. It reads:

"During the six months following the coming into force of the present treaty the manufacture and importation of aircraft, parts of aircraft engines for aircraft and parts of engines for aircraft, shall be forbidden in German territory."

Ace of Aces to Greet Maeterlinck From Air

Colonel W. A. Bishop, Royal Air Force, greatest ace of the war, will drive a large aeroplane, designed to represent a bluebird, over New York Bay the day of the arrival of the France, which leaves Europe to-day with Maurice Maeterlinck aboard. He will carry an invitation to the author to attend a bluebird ball at the Waldorf-Astoria December 26.

The national campaign for happiness will gain headway as the famous Belgian poet and dramatist arrives. The work connected with the reception is in charge of a committee headed by Mrs. William K. Vanderbilt, Jr., Mrs. Harry Payne Whitney, Mrs. Newbold Le Roy Edgar and Mrs. Whitney Warren. The bluebird ball will be held the night before the world premiere of the opera written by Albert Wolff, based on Maeterlinck's "Bluebird," at the Metropolitan, with Mr. Wolff conducting.

The funds from the opera and ball will be divided among four organizations. The money will be devoted to the work of the Queen of Belgium Fund, represented by Mrs. Newbold Le Roy Edgar in this country; the Millerand Fund for French Children, in charge of Mrs. Edgar and Mrs. Robert Bacon; the Milk for American Children Fund, headed by Mrs. Robert Bacon; the Milk for American Children Fund, headed by Mrs. Sidney Borg.

Briton Wins \$50.000. Flies to Australia

Briton Wins \$50,000. Flies to Australia

Port Darwin, Australia.—Capt. Ross Smith, the Australian aviator, arrived here December 10 from England, thus winning a prize of \$40,000 offered for the first aviator to make the trip. The Sydney Sun also gives a prize of \$10,000.

Under the conditions laid down by the Australian Government when it offered a prize for making a flight from England to Australia the distance of 11,500 miles had to be covered within thirty days.

Capt. Smith left the Hounslow Aviation Field, near London, at 9 o'clock November 12, on his flight to Australia. On November 18 he reached Cairo and on November 19 he continued his flight. On November 23 he reached Delhi, India. From there he continued east until he reached Rangoon, turning southward at that city, making a number of stops along the Malay Peninsula and in the islands of Oceanica. He arrived at Bima, on Subawa Island, near Java, Monday night.

Smith's only serious competitor was Lieut. Etienne Poulet, the French military aviator, who left Paris on October 14, nearly a month before Smith started from London. The Englishman caught up with Poulet in India, the aviators meeting in Rangoon on November 30 and both leaving for Bangkok on December 10. The two airmen started off nearly together from Bangkok the day following. No reports have been received as to the whereabouts of the French aviator after leaving Bangkok.

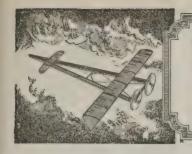
Poulet Will Fly In Round Earth Derby

Poulet Will Fly In Round Earth Derby
Paris.—The Auto announces that
Lieut. Etienne Poulet, the French
military aviator, who attempted a flight
from Paris to Melbourne, has entered
the round the world derby of the Aero
Club of America. The Auto says Poulet will overhaul his engines on his arrival at Adelaide and fly back to Paris
and then commence preparation for the
club's race. Poulet has just received
an award of the military medal for his
services during the war.

A delegation from the club composed
of Augustus Post, William F. Hogan,
George F. C. Wood and I. F. Campbell conferred with Prince Roland Bonaparte, President of the International
Aeronautic Federation, and extended
to him formal invitation to attend the
annual conference of the federation in
1921, to be held in the United States.
The proposed aerial derby, the rules
for next year's competition for the
James Gordon Bennett Aviation Cup
race and other contests were discussed.
Poulet left Paris October 14 in the
race to Australia, which was won by
Capt. Ross Smith, who overhauled
Poulet in India and reached Port Darwin, Australia, Wednesday. The last
report concerning Poulet was his departure for Bangkok from Rangoon,
December 1.



The 450 h.p. Napier engined AIRCO 9R plane, which on November 15 secured eighteen Official British records. All the records were secured on one flight by one pilot without landing. The pilot, Captain Gathergood, is seen in front of the machine



# ELEMENTARY AERONAUTICS

#### and MODEL NOTES

By John F. McMahon



#### The Motorcycle Engined Aeroplane

(Continued)

The main characteristics of the aeroplane under consideration are as follows:

C	24	c.	
Span			
Length	161	∕2 ft	
Chord	6	ft.	
U. S. A. wing curve	. 1		
Area wings		sq.	ft.
Area rudder			
Area tail	19	sq.	ft.
Weight, wings complete	50	lbs.	
Weight, tail and rudder	10	1bs.	
Weight, fuselage, including wheels	75	lbs.	
Weight, motor	85	lbs.	

The fuselage construction is simple and all elaborate fittings such as expensive turnbuckles and piano wire have been eliminated. Of course, parts can be used in this little machine that would not be of sufficient strength for a larger, heavier one, so this allows a light, cheap body, and one that will stand a certain amount of abuse.

The longerons are 5% in. square. Ash is used in front and spruce or fir to the rear of the cockpit. The ash members are joined to the spruce or fir by tapering the ends of each and fastening them together with glue, then wrapping with linen cord or silk ribbon.

The bracing struts in between the longerons should be of the same material as that of the longeron to which they are attached. They are held together by means of simple fittings made from chean iron about 22 gauge. If the builder wiches

attached. They are field together by means of simple fittings made from cheap iron about 22 gauge. If the builder wishes he can make his fittings as shown in the enlarged sketch at the bottom of the fuselage. These fittings are bent at an angle of 90 degrees and the struts are fastened to them with  $\frac{1}{8}$  in. bolts. The struts should be wrapped in linen, pasted with hot glue at the ends, and the bolt holes drilled when

dry.
Only a few dimensions are given in the drawing for the sake of clearness, but a scale is shown with each drawing

that can be used as well. By using this, the length of all the parts can be determined and proper niting of them is

Note the landing chassis axle plate with a hole in it for Note the landing chassis axle plate with a hole in it for the axle, This plate also acts as an anchor for the engine and pilot's compression struts, thereby strengthening the forward part of the fuselage and making a neat, compact landing chassis arrangement. The engine bed is fastened by steel plates 1/16 in. thick to the front of the body where the upper and lower longerons meet, and at the rear to a cross brace that is fastened to the two vertical struts from the center of the landing chassis plate.

The seat is made of 22 gauge aluminum lightened by drilling large holes as shown by the illustration in the lower left-

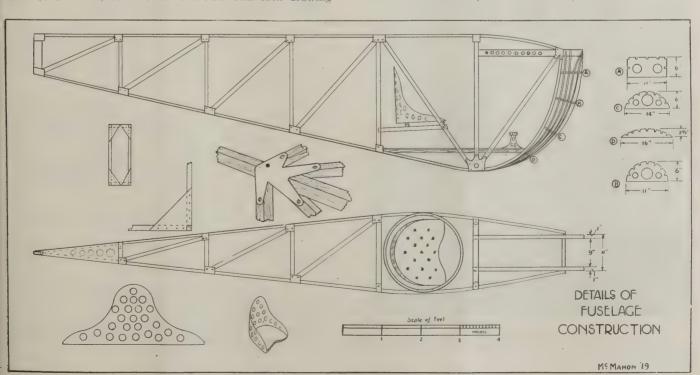
ing large holes as shown by the illustration in the lower left-hand corner of the cut. The aluminum is cut to the shape shown, then fastened by screws to a veneer panel 1/4 in. thick. The seat is then placed in the body and held by bolts

thick. The seat is then placed in the body and held by bolts to two cross pieces of  $\frac{1}{8}$  in. ash, which are in turn fastened to two more  $\frac{1}{8}$  in. ash strips running from front to rear and bolted to the two body struts as shown.

The next thing to do is to put a flooring of  $\frac{1}{8}$  in. veneer, glued and nailed to two reinforcing spars running from the lower longerons where it is curved, then fastened to the strut just behind the seat. The last section of the fuselage is braced on top and bottom with thin veneer glued and nailed to the longerons at that point. To save weight large as braced on top and bottom with thin veneer gitted and nailed to the longerons at that point. To save weight, large holes should be drilled in the veneer as shown. The box bracing is taken care of by using corner pieces of ½ in. plywood which saves labor and is strong enough for a light machine. The enlarged corner sketch shows how the triangular piece is fastened, while the smaller one above it illustrates how a cross section of the body would look at that point.

In order to cut down resistance it is necessary to round the chest of the body to cut into the air currents easily. Therefore, the nose is rounded by placing veneer formers as shown to the right at equal distances apart. The formers are placed as designated by the letters. Notches 3/16 in. wide and % in. deep are cut around the edges and, when fastened in place, strips of light wood, preferably spruce, are placed in these slots and nailed. When the cloth is pulled tightly over these strips, it rounds out and the front portion takes on a somewhat streamline shape.

(To be continued)





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Easy Winner

The Burgoon (Ohio) High School delegation wins the Record's Freshman Pin Contest. The winner, Mr. Brughalter, wears two more pins than his nearest rival, carrying off the honors easily with a birdie eight. Mr. Brughalter has on his vest point an I Psi Tu fraternity pin, an O Mi I sorority pin, and a pin of each of the 3d and 5th Liberty Loans. On his lapel he carries a B. P. O. E. pin, a pin bearing the lavender and pink "B" of the Burgoon High School, a Woodrow Wilson campaign button, and a pair of S. A. T. C. crossrifles—Record

Lines telegraphed to Mrs. Alba Heywood and Alba, Jr., San Benito, Texas, by daddy.

They had begged daddy never to ride in an aeroplane. He reasoned with them that any man who had lived during this great mechanical age and had seen such a wonderful invention as the aeroplane developed to a semi-safe basis, was entitled and really ought to experience this new method of travel at least once. He made the trip in a Curtiss plane at Amarillo, Texas, Nov. 2, 1919, with F. W. Hines, pilot.



-Courtesy, "The Aeroplane.

What are we stopping for Captain?
Well, you see Sir, it's this way. We were flying thro' the Milky
Way and the propeller got foul of it and now we're aground on
a pat of butter.

Oh, Clarice, I'm so worried. You know you told me to put that piece of wedding cake under my pillow and I would dream of my future husband

Yes, dear. What happened?

That's what worries me. I dreamed of the whole R A F.

One of the passengers of the new transatlantic air liners was a man who stuttered badly. During the trip he leaned forward, prodded the pilot in the back, and tried to overcome the double handicap of his affliction and the roar of the engines.

The pilot hurriedly shouted to him, "I'm busy now, tell the navigator." When the stutterer got the navigator cornered, he said, "The-th-th-th-"

"Look here, man, sing it," said the navigator. "That's the only way."

Whereupon he was surprised to hear:

"Should auld acquaintance be forgot, and never brought to mind?

I've dropped my false teeth overboard and they're twenty miles behind."

"How are you affected?" said the medical officer as the cadet reported from his first flight in an observation balloon.

"I feel all right, sir, but the whole trouble seems to be that whatever I swallow goes A W O L."

The young pilot whose plane had hit a man while landing ran down to the hospital in his motor car to see his victim.

"You know you must have been very careless in your walking," he said. "I am a good pilot. I have been flying for over two years."

"You've got nothing on me, sir," said his victim. "I've been walking for forty."

Two fair young stenographers at the flying field were talking about their work. "Isn't it fierce," said one, "the amount of work we are getting now?"

"Fierce," retorted the other one, "I should say so. Only yesterday I typed so many letters that I ended up my prayers last night with 'This for your information and immediate action'"

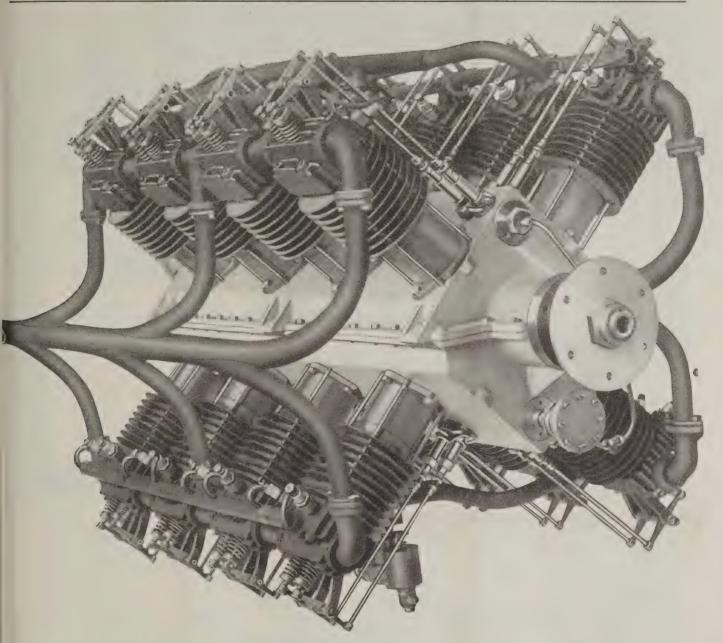
"Well, son, I'm glad to see you back from the war without a scratch."

"Oh, yes, father, I stopped scratching when I joined the Air Service."

"You've fallen out of line not less than five times; you should not be in this regiment at all," cried the instructor at the officers' training camp.

"Where should I be?" demanded the recruit.

"In the flying corps, and then you'll only have to fall out once."—Pittsburg Chronicle-Telegraph.



# The VIKING 140 H. P. Aviation Motor

A 16 Cylinder, Air Cooled, Ball Bearing, Light Weight, Flexible, Vibrationless, Long Life Motor.

A scientifically constructed motor, having 8 power impulses overlapping each other, every revolution of the crank shaft, built of the best materials known today. A motor that responds to the throttle instantly, uses less gas and oil.

MANUFACTURED BY

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1330-33 Majestic Building
Detroit, Michigan



# Aircraft Progress Cited in Annual Navy Report

Washington, D. C.-In the Annual Report of the Chief of the Bureau of Steam Engineering, Rear-Admiral Griffin gives some data on the transatlantic flight of the NC boats as follows:

The Liberty motor, which was used in all three boats, was modified as the result of laboratory tests to effect a saving of of laboratory tests to effect a saving of from eight per cent. to twelve per cent. in fuel economy, at full and reduced powers, respectively. The bureau's calculations gave an approximate figure of 1.25 gallons per knot under the conditions obtaining for the transatlantic flight. The NC-4 had on board 1,610 gallons of gasoline when leaving Trepassey. Upon arrival at the Azores 270 gallons remained, the fuel consumption averaging 1.12 galthe fuel consumption averaging 1.12 gallons per knot. Weight of boats, crews and equipment as they left the water at Trepassey, 28,700 pounds each. Total fuel-carrying capacity, 1,800 gallons.

The bureau's cognizance in connection with aircraft covers the features of main propelling engines and propellers; auxiliaries such as radiators, tanks, starters, tachometers, wind-driven generators for auxiliary service, etc.; interior communications, lighting, radio and balloon gas for lighter-than-air craft. During the year \$50,000,000 was allotted to the bureau for material under its cognizance, about \$7,000,000 of which was returned subsequent to the armistice. Expenditures subsequent to the armistice amounted to about \$15,000,000, including \$4,000,000 for obligations incurred in Europe and a number of large items for which funds had been with aircraft covers the features of main of large items for which funds had been previously obligated and which could not be canceled.

#### Young America Views the City from Aeroplane

Charleston, S. C.—The youngest citizen of Charleston, S. C.—The youngest citizen of Charleston to tempt the perils of the air and view his city from the clouds is James Thompson, the eight-year-old son of Mr. and Mrs. James T. Thompson of 8 Carolina Street, who went up with the Liberty Flyers, Inc. The lad seemed to greatly enjoy the novel experience.

Not being satisfied with having the record for carrying up the youngest Charles-

Not being satisfied with having the record for carrying up the youngest Charlestonian, the Liberty Flyers, Inc., also acquired the record for taking up the youngest little lady who has ever been up in a plane. Little Miss Norma Cruickshank, the thirteen-months-old daughter of Mr. and Mrs. Richard Cruickshank, was the passenger who is said to be the youngest person who has ever gone up in the air. The little girl was taken up in the arms of Mrs. Cruickshank, the wife of the famous Chicago parachute jumper, who is a member of the Liberty Flyers organization.

#### Personal Par

Major George F. Lyon, recently discharged from the U. S. Air Service, has accepted the position of Division Manager of Eastern Siberia for the American Red Cross with Headquarters at Vladivostok. Major Lyon was assigned to active duty with the Air Service, Aircraft Production, in August, 1918. Before becoming attached to the Air Service, he served for sixteen years as quartermaster, executive officer, etc., with the Philippine Government.

#### Seagull Flies to New Orleans

W. E. Doherty, formerly lieutenant in the United States Naval Flying Corps,

who saw several months' service in Italy, is now in New Orleans on a demonstration tour with a Curtiss Seagull three-passenger flying boat. The Seagull was flown from Memphis, Tenn., to New Orleans—a distance of 850 miles—stops being made at Greensville, Vicksburg, Natchez and Baton Rouge. It is the first time that the Seagull has made its appearance on the Mississippi River, and, according to Doherty, great interest has been aroused by the expedition. Chambers of Commerce are thoroughly interested in aviation and plans are under way bers of Commerce are thoroughly interested in aviation and plans are under way for the opening of municipal fields and the organization of aviation companies in many cities. In Memphis, the Seagull met the NC-4 which is now on a recruiting tour in the Mississippi Valley. Stanley H. Tresevent, U. S. Marshal, deputized the Seagull to hunt down illicit liquor transportation. Learning that a liquor transportation. Learning that a shipment was to be made, Marshall Tresevent and Pilot Doherty went on a two-hour flight up the Mississippi River, but their efforts were unsuccessful. Memphis and also en route to New Orleans. The Seagull will remain in the south for a considerable period, making passenger flights, doing demonstration work and in promoting general aviation interests. interests.

#### Metal Specialties Company Organized

Milwaukee, Wis.-The Wisconsin Machine Products Co. has been incorporated with a capital stock of \$10,000 by Jay J. VanVechten and Robert A. Radwick. It will manufacture automotive machine products and other specialties.

# ALRIAL AGE WEEKLY

l. 10, No. 11

**DECEMBER 29, 1919** 

10 CENTS A COPY



Following the Recent Successful Aerial Tour, Alfred W. Lawson is Establishing Permanent Air Lines From the Atlantic to the Pacific.

British Dirigible Invited to Havana Aeronautic Congress

I IED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY

# "Round the Rim"

Over 9,823 Miles

ON THE ORIGINAL 48

# **B-G SPARK PLUGS**

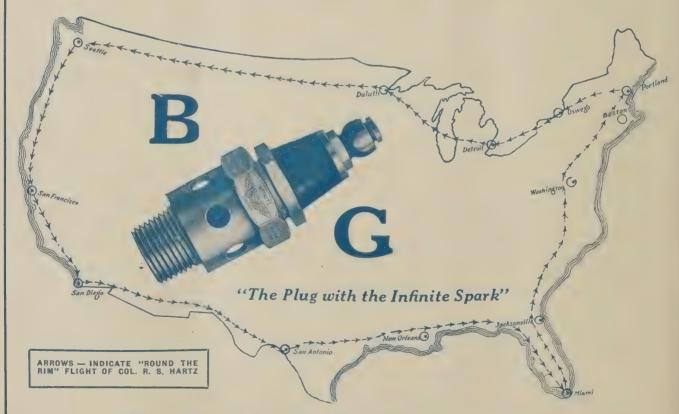
NOT ONE OF WHICH WAS REMOVED FROM THE MOTORS DURING THE ENTIRE TRIP, FROM JULY 24th TO NOVEMBER 13, 1919

By Col. R. S. Hartz

"The spark plugs were B-G plugs. They were tested for 30 minutes in a DH prior to the flight. While on the flight they had 24 hours and 25 minutes warming time and approximately 114 hours and 45 minutes flying time, total of 140 hours, which brings the cost for plugs per hour to \$.0214.

"It might be well to call attention again to the fact that these plugs were outdoors with the exception of two nights, from July 24th to November 9th in a storm, the duration of which was over two hours, and stood out for 31 days before the flight was resumed, in practically all possible climatic changes in the United States for this season of the year and not once during the entire flight was there a spark plug miss. After standing out for 31 days in all kinds of weather it was found that the first time the left motor was cranked it took and the second time the right motor was cranked it also took. During the entire flight whenever it was hard to start the motors we found it was gasoline and not motor ignition trouble that caused it. The longest sustained flight made during the trip was, from ground to ground, 7 hours and 20 minutes."

(From Official News Bulletin, Department of Military Aeronautics)



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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., December 29, 1919

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

**DECEMBER 29, 1919** 

NO. 11

# \$1,000 IN PRIZES OFFERED FOR BEST AERIAL LIFE **PRESERVER**

#### Contest to be Held at Havana Airport During Third Pan-American Aeronautic Congress

O bring about the development of an efficient parachute which will be to the aviators and air travelers what the life preserver is to sea travelers, the sum of \$1,000 has been offered for prizes to be awarded in a competition to be held at Havana during the Third Pan-American Aeronautic Congress, February 21 to March 1, 1920.

This announcement was made through the Aero Club of America by Mr. Eusebio S. Azpiazu, Chairman of the Contest Committee of the Third Pan-American Aeronautic

Congress.

The purpose of the contest will be to test not only parachutes to determine their efficiency but also to test the various methods of attaching the parachutes to the aeroplane and to determine whether it is necessary to have a different method or one method will be sufficient for different types of large aeroplanes as well as small aeroplanes or seaplanes.

It is the belief of aeronautic authorities that as soon as efficient parachutes are to be had and fool-proof methods of using them have been evolved, the carrying of parachutes on aeroplanes will be made compulsory just as it is compulsory to carry life preservers on ships at sea.

Some of the results to be obtained in this contest for aerial life preservers are:

(1) To find the best way to attach a parachute to an aeroplane or to the aviator, so that it can be operated whether the aeroplane is at an even keel, or climbing, or diving, or side-slipping, or upside down.

(2) It must be remembered that when a plane is traveling at a speed of from 90 to 150 miles an hour—and there are machines going even faster-the pilot only has seconds in which to think and act, therefore the parachute attachment

must be simple and must work instantly.

(3) The parachute may be fastened to the back of the pilot himself, or to the aeroplane, on the fuselage, back of the pilot; or under or to the side of the fuselage, or at the trailing edge of the lower panel of the wing, or to the seat of the aeroplane. But it must be remembered that the pilot is fastened to his seat by a safety belt which he must unfasten before the parachute is opened, else he will have the pleasant experience of having the parachute pull the upper haif of his body in the opposite direction from which he is traveling. The parachute would eventually collapse, but so would the aviator.

- (4) Having found the best method of attaching the parachute, the next important thing is to have a parachute that opens quickly, does not drop too fast and does not oscillate overmuch while descending. The average parachute opens in about a 150-foot drop, then descends at a speed of about 20 feet a second.
- (5) A parachute need not be heavy to be safe and weight is objected to in an aeroplane because it decreases the useful load of the plane. A parachute of Japanese silk about 18 feet in diameter, capable of sustaining a man weighing 150 pounds, will not weigh more than 15 pounds. The fear on the part of aviators that a parachute would weigh 40 or 50 pounds is one of the factors that has retarded the adoption of the parachute as a life saver. A large parachute is bad because it usually oscillates and slides side ways after it oscillates. On the other hand, a too small parachute will travel down too fast.
- (6) Such pioneers as Thomas S. Baldwin and A. Leo Stevens found by practice that they could, to some extent, control the direction of the fall of the parachute by pulling the ropes on any one side of the parachute, forming a sail of that side of the parachute, so that it would result the wind carrying the parachute in a given direction. They also found that if they were traveling in a current which was taking them away from the desired landing place, they could pull the ropes on two sides to drop faster, thereby getting out of that air current which was taking them in the wrong direction.
- (7) Another important thing which must be given attention is the harness which connects the pilot to the parachute while he is descending. With a good harness the pilot will feel fairly comfortable while descending and he can detach himself immediately upon touching the ground so as not to be dragged over the ground by the parachute in the event of there being a strong wind close to the ground. Besides saying the lives of aviators and air travelers in

case of accident it is expected that parachutes will be used extensively in future to drop mail and packages from aerial mail planes at stations where the planes do not land to

get mail.

Toward the close of the war parachutes were used by the Allies to supply ammunition to infantry and machine gunners on the front line, who were cut off from the rest of the fighting forces by German barrage fire. Boxes of ammunition were attached to parachutes, which were dropped over the fighting infantry and machine gunners, who were then enabled to proceed with advances and take important positions which could not have been done otherwise.

Competitors for this and the \$25,000 contests announced in the last number of Aerial Age should file their entry for this contest with Mr. Ensebio S. Azpiazu, Chairman Contest Committee, Liga Aera de Cuba, Mauzana de Gomez, Havana, Cuba

Cuba.

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## CUBAN AUTHORITIES INVITE BRITISH GOVERNMENT TO SEND DIRIGIBLE ACROSS THE ATLANTIC TO HAVANA FOR THIRD PAN-AMERICAN AERONAUTIC CONGRESS

Another dirigible trans-Atlantic flight is forecasted by the Aero Club of America as the result of an invitation sent by Mr. Eusebio S. Azpiazu to the British Government to send one of the large British dirigibles to Cuba for the Third Pan-American Aeronautic Congress to be held February 21 to March 1, 1920.

Mr. Azpiazu has arrived in New York with Mrs. Azpiazu to receive Mrs. Menocal, wife of President Menocal, who arrived in New York on the Rotterdam, together with Mr. Mario G. Menocal, Jr., son of General and Mrs. Menocal.

A reception was given to Mr. Azpiazu by the Aero Club of America and he discussed the plans of the Cuban Government for the establishing of aerial mail and transportation lines in Cuba and from Cuba to the United States and other countries, with Colonel Jefferson de Mont Thompson, President of the Club, Alan R. Hawley, Chairman of the Contest Committee, Colonel Charles Elliott Warren, Henry Woodhouse, Vice-President, Aerial League of America, Major Granville A. Pollock, Major Redondo Sutton, who has been flying since 1910, having been one of the first five United States Army Officers to take up aviation; G. Douglas Wardrop, Editor of "Aerial Age Weekly," Victor Hugo Barranco, Rear Admiral Bradley A. Fiske; John Hays Hammond, Jr., and Major Reed G. Landis, second ranking American Ace.

Mr. Azpiazu stated that Camp Columbia, near Havana, is to be a permanent airport. A hangar 500 ft, wide and 250 ft, deep is being constructed to house the large 16-passenger French aeroplanes bought by Mr. Hannibal J. de Mesa, the wealthy sportsman, who is establishing the air line in Cuba.

Mr. Azpiazu related how Mr. de Mesa tried to get aeroplanes in the United States early this year and could not get promise of deliveries from American manufacturers, so he bought some French machines.

But while the French manufacturers made prompt deliveries, the shipping situation prevented the machines being shipped until two weeks ago and then the steamer on which they were shipped had propeller troubles and had to go to a Spanish port to make repairs. The machines are, however,

on their way to Cuba, although in the last analysis Mr. de Mesa did not get his machines any sooner than he could have gotten them from American manufacturers, because of the shipping difficulties.

Mr. Azpiazu points out that the difficulties in shipping from Europe will give a marked advantage to manufacturers of aeroplanes in getting orders from the representatives of the Latin-American countries who will attend the Third Pan-American Aeronautic Congress to be held at Havana, Cuba, from February 21 to March 1, 1920, and who are expected to place orders for aircraft, motors and accessories amounting to close to \$50,000,000.

Leading aeronautic authorities state their belief that the British Government will send a dirigible to Cuba for the Congress. It is pointed out that the R-34 came to the United States as the result of an invitation extended to the British Government by the Aero Club of America and the Aerial League of America for the Second Pan-American Aeronautic Congress. Two officials of these organizations, Colonel Charles Elliott Warren and Henry Woodhouse, guaranteed the expenses for mooring and re-inflating the dirigible while in the United States. The British Givernment promptly accepted the invitation and sent a commission to the United States to inspect the Atlantic City Airport and arrangements made there for the mooring of the dirigible and supplying the 650,000 cubic feet of hydrogen needed for the return flight across the Atlantic. At the time all the hydrogen generating plants were controlled by the Government and all the hydrogen available was held by the U. S. Army and Navy. As release for generating plants could not be obtained on time, it was arranged for the Navy to handle the R-34 at the Army aviation field at Mineola.

Mr. Azpiazu states that President Menocal and other Government officials are greatly interested in aeronautics and realize fully that Cuba is to be an important stopping station for inter-continental, trans-Atlantic and Trans-Pacific air liners. Therefore, every effort is being made to make Cuba an aeronatuic center and prepare for the advent of international aerial transportation lines.

#### RECORD OF THE LAWSON AIRLINER

HE records established by the Lawson Airliner in its various experimental flights form one of the most

significant events in American aeronautics.

The Lawson machine started from Milwaukee on a twentyfive hundred mile trip without any preliminary flying and the trip was completed without a change being necessary in any feature of the machine. During this trip nearly four hundred passengers were carried including some of the foremost men and women in America, and not a single accident to a passenger had to be recorded. En route stops were made at Chicago, Toledo, Cleveland, Buffalo, Syracuse, New York, Washington, Corpellaville, Dauton, Indianasoli, Chicago, Corpellaville, Dauton, Indianasoli, Chicago, Corpellaville, Dauton, Indianasoli, Chicago, Ch York, Washington, Connellsville, Dayton, Indianapolis, Chicago, and back again to Milwaukee. When in the air the machine behaved beautifully even though very heavy weather was encountered over the Chesapeake Bay and Allegheny

In a communication which we have just received from the designer and navigator, Alfred W. Lawson, he points out that he has an excellent claim to the following records:

First, the world's altitude record for ten passengers when

the Liner climbed to a height of fifteen thousand feet while crossing the Cumberland Mountains.

Second, the Lawson Airliner broke all passenger carrying records for distance of two hundred and fifty miles when it carried fourteen people between New York and Washngton, D. C

Third, the Lawson Airliner broke all world's records in carrying eleven passengers a distance of three hundred and thirteen miles between Syracuse and Mineola and at the same time broke all speed records for the Syracuse-New York journey, which was made in two hours and thirty-two

Fourth, the duration record for fourteen passengers was also broken by the Lawson Airliner in going from New York to Chicago when it remained in the air for four hours

and thirty minutes.

But the most important thing of all which the Lawson machine demonstrated was that passenger carrying from city to city is an assured fact and can be accomplished with little or no danger to the passengers

Mr. Lawson reports that the behavior of the passengers on the various flight was very much as though they were travelling on an ordinary land or ocean conveyance. They occupied their time writing letters, typewriting correspondence, knitting, crocheting, sewing, shaving, shooting craps, playing cards, and various other things showing that business and pleasure can be equally engaged in by the air

New types of the Lawson machine are being developed and the management of the company expects to have various airlines in operation within the next six months, including a direct line from New York to San Francisco.



# THE NEWS OF THE WEEK



#### Flight to Australia

Captain Ross Smith's flight from London to Australia is the longest that has been undertaken in competition. The distance is 11,500 miles. It was covered in 28 days, two days less than time limit set by the conditions of the contest. In terms of elapsed time it was not a very remarkable feat, but, Captain Smith evidently taxied along without any effort to establish a record. The only sign of a race was when he met with Lieut. Poulet, the French entrant, at Rangoon, November 30. Most of the flying was done over land. The last lap of the journey from the mainland of Asia to Australia was broken by several landings on islands. In no way was this flight comparable with the transatlantic flights of last spring. However, it demonstrates the possibilities of long distance flying, and may be regarded as pointing the way for some remarkable developments in the near future, in the air.

#### La Guardia May Decide to Stay in Congress

Washington.—Representative La Guardia, Republican of the Fourteenth New York District, said to-day he is seriously thinking of passing up the office of Chairman of the New York Board of Aldermen, to which he was elected in November, and remaining in Congress. He made the announcement after the House Military Affairs Committee voted in executive session to defer action on bills looking to unification of the several air services of the Government.

#### 226 Miles an Hour Made by French Flier

Paris.—A burst of speed of approximately 226 miles an hour was scored by Sadi Lecointe, the noted French aviator, in an officially timed aeroplane test.

Lecointe, who holds the French record for height and broke the French speed record last September, covered the distance of a kilometer in the latter test at an average speed of 307.225 kilometers

(about 190 miles) an hour, while during some seconds of his flight he reached a speed of 364.5 kilometers (226 miles) an hour, or about 3¼ miles a minute.

#### Britons Plan Weekly Air Service to U. S.

London.—A weekly airship service to America is contemplated by a combination of aviation firms which are credited with the intention of acquiring the famous R-34 and her sister ship, the R-39. These are being altered to meet passenger and cargo requirements.

#### Flies to Her Havana Job

A sudden call for extra goods to be displayed at the Havana exhibitions of the John Wanamaker store was responsible for a quick trip by Mme. Germaine Madelaine, millinery expert, to Palm Beach, where she took an aeroplane of the American Transatlantic Oceanic Company of New York to Havana.

A cable message was received from the pilot, David McCulloch, announcing that the trip had been made successfully in 3 hours 50 minutes, beating the time by rail and boat by 15 hours. McCulloch was a member of the crew of the NC-3 of Transatlantic fame.

#### British Companies Desire Liberty Motors

According to a report received from England a number of commercial Aircraft Companies in England are very desirous of obtaining Liberty motors in a moderate quantity for utilization in their commercial types of aeroplanes. It is apparently impossible at the present time for such companies to obtain any Liberty Motors through the British Air Ministry, and it is believed that if arrangements could be made to establish an agency for Liberty Motors in England there would be a considerable demand for them.

Among the Companies that have specially signified their desirability of obtaining Liberty Motors may be mentioned The British Aerial Transport Co., Ltd., and the Westland Aircraft Engineering Co., Ltd.

#### First Aerial Customs Officer

Niagara Falls is to have an aerial customs inspector next spring. Lieut. Paul R. Moore, pioneer in the operation of a sightseeing aeroplane over Niagara's cataracts, has received the appointment, T. M. Hennessy, deputy collector in charge of the United States customs at this port, announces.

Mr. Hennessy said that customs officials have foreseen the day when an aerial patrol along the frontier would become necessary to prevent frauds against the government's revenue. The local deputy has had several conferences with Lieut. Moore with the idea of placing the port of Niagara Falls and this customs district first in the field as regards aerial protection and the aviator has consented to accept appointment as a U. S. customs officer.

#### Co-Operation with U.S. is Sought

London.—Maj. Gen. Sir F. H. Sykes, British controller general of civil aviation, hopes to arrange for complete co-operation between Great Britain and the United States in all matters relating to flying. This is the purpose of his journey to America, on which he expects soon to leave.

to leave.

"The national tendency in aircraft development in Britain," said Gen. Sykes, "is to allow individual enterprise to work out its own salvation in the main and no scheme of government subsidies such as that in France has so far been adopted."

But he pointed out that did not mean that the government will spend nothing to promote enterprise

opromote enterprise.

"With a view to stimulating the efforts of designers and manufacturers of heavier-than-air craft and to guiding them toward the attainment of greater security and reliability," he continued, "an official competition has been instituted, which is to be held next year. The prizes offered amount to £64,000. The rules of the competition are framed to encourage those attributes which are required in the future.



The Aeromarine Model 40 Flying Boat equipped with Aeromarine Model L 125-130 H. P. motor

#### Films Used for Vocational Training

The Mechanical Instruction Branch of The Mechanical Instruction Branch of Training and Operations Group, Air Service, recently received from England films showing divers instructions in connection with aeroplanes, machine guns, etc. These films are to be used for instructional purposes and will be circulated to all Air Service Stations in conjunction with Vocational Training. They include the following: Theory of flight (3 parts); dope and fabric; repairing—different stitches used in sewing rents in ferent stitches used in sewing rents in wing covering; proper application of matches, etc.; cable splicing; LeRhone Motor 120 H.P., general description, carburetion and oiling system; Lewis machine gun; the ring sight; the use of the camera, L type.

#### Planes to Aid Fishermen

San Diego, Cal.-A seaplane patrol to locate schools of fish and flash the direction by wireless to operators of the local fishing fleet was in operation off his port. The patrol consists of two government planes, which relayed reports through a submarine chaser in the harbor. In fifteen minutes pilots of planes reported two schools, which provided the fisher. men with a profitable day's work.

#### Fliers Brave Bitter Cold

Two aeroplanes of the army coast pa-

Two aeropianes of the army coast patrol took off into the bitter air above Mitchel Field, Mineola, on Dec. 18, on a flight to Langley Field, Va.

The men, the planes and the fuel were protected as much as possible from the cold, for flying in this sort of weather is with a comparately properly the property of the page of the cold, for flying in this sort of weather is with a comparately properly the page of the cold, and the cold is the configurately properly the page of the cold is the cold in the cold i cold, for flying in this sort of weather is neither comfortable nor sure. The men, Lieuts. Claude Duncan and Russell W. Fox, pilots, and Sergeants F. Whitman and C. E. Woolsey, observers, wore leather and fur clothing and smeared their faces thickly with heavy castor oil. The radiators of the De Haviland planes were accounted to prepare the hitter minds. were screened to prevent the bitter winds from freezing the cooling system and al-cohol was added to the gasoline to prevent fuel difficulties.

#### Aeronautical Society for City College

The College of the City of New York has organized an Aeronautical Society which will hold a series of meetings durbe delivered once a month by prominent aeronautical engineers and it is anticiaeronautical engineers and it is antici-pated that valuable work will be done by the members.



C. D. and C. E. Stacy, inventors of the Stacy Aeroplane which will be described in our next

#### Electioneering by Aeroplane

Lieut. Paul R. Moore, who has just been appointed the first aerial customs officer at Niagara Falls, N. Y., relates how he brought the first aeroplane into politics actively. While he was flying at Niagara Falls, he was engaged by a prominent candidate for the Supreme Court bench to carry him about his constituence on a caseling tour. stituency on a speaking tour. Lieut. Moore says he doesn't say that the aeroplane elected him but he thinks the facts speak for themselves. In every division visited by aeroplane his candidate was visited by aeropiane has candidate elected by an overwhelming majority and he now is a Supreme Court Justice. candidate was Alonzo G. Hinkley.

#### London-Paris Aero Mail

The inauguration of an aero mail service between London and Paris beginning

ice between London and Paris beginning November 10, is reported in a mail despatch to the Department of State.

Unregistered and registered letters, postcards, printed papers and commercial papers and samples are accepted for transmission, but not parcels or insured correspondence. In addition to the usual foreign postage (and registration fee where payable) a special charge of 2s.6d. per ounce is made. per ounce is made.

Correspondence is accepted daily (Sundays excepted) at all the principal district and largest post offices in London up to certain stated times (ranging from 10:35 a. m. to 11:15 a. m.), and is sent by aeroplane and delivered in Paris in business hours the same day. The time saved, as plane and delivered in Paris in business hours the same day. The time saved, as compared with ordinary land and sea service, is approximately 16 hours. Correspondence for places beyond Paris is forwarded by the next available train, and in France is delivered by express on arrival at office of destination. To countries beyond France the time saved amounts to about 24 hours.

Correspondence from Paris reaches London during business hours the same day and is delivered by express messenger without additional charge.

#### New Aeroplane Company

Fairmont, W. Va.—The Southern Aeroplane Company, capitalized for \$100,000.00, was recently formed here for the purpose of carrying on a commercial flying business in a number of Southern States of the Ohio and Mississippi val-ley. The company will begin operations as soon as they can obtain suitable planes.
A number of former over-seas pilots are
connected with the organization.
The officers are as follows: Harrison

The officers are as follows: Harrison R. Tucker, President; John J. Niles, Vice-President; G. H. Barger, Secretary; H. President; G. H. B. R. Hall, Treasurer.

#### Aerial Inspector of Waterways

Mr. J. Spencer Smith, President of the State Board of Commerce and Navigation, went up for a flight a short time ago with Earle Ovington, President of the Curtiss Flying Station at Atlantic City. Most of the flight was over the inland waters in the vicinity of Atlantic City. As the day was very clear the sand City. As the day was very clear the sand bars and bottom were very easily seen. Mr. Smith was very much interested in the ease with which the bottom of the inland waterways could be inspected and was much impressed with the efficacy of an aeroplane for this work. After the flight was over Mr. Smith expressed his desire that Mr. Ovington should accept the position of Aerial Inspector of the State Board of Commerce and Navigation. The official appointment of Mr. Ovington to this position shortly followed. So far as is known this is the first time in the history of the world that an aeroplane has been used for inthat an aeroplane has been used for inspecting inland waterways, an aeronautic field which has a bigger future and more possibilities than the average person would think.



C. L. Venard, president, and J. W. Becher, pilot, of the Venard Photo graphic Co., of Peoria, Ill., who have made their slogan "we photograph anything, anywhere, any time" real

#### Cleveland Aviation Club Active

(The Cleveland Aviation Club's Country Home)



HE Cleveland Aviation Club, organized by a group of ex-service aviators and business men interested in the development of commercial and sport aviation, is doing excellent work in fostering concrete interest in aerial transportation. The club house is situated on Mentor Plains Road, Willoughby, in the center of the millionaires' club territory, and comprises 115 acres of land, with excellent facilities for water flying.

Army routine is adhered to in the club,

the members appreciating the advantages of well-regulated outdoor life.

Major A. W. Harris is president of the club; Lieut. F. H. Boyd, vice-president; Lieut. Fred E. Luff, treasurer; Lieut. Rex L. Uden, secretary. The board of directors includes the officers and F. F. Stafford, L. G. Hawthorne and C. L. Howells.

Major I. H. Chase is chairman of the entertainment committee and Captain C. W. Keene chairman of the publicity committee.

The club has now 175 flying members and 100 associate members. The life members include Orville Wright, Glenn L. Martin, Al Enfel, Captain Eddie Rick-enbacher and David Ingalls, America's only naval ace.

The City Council of Cleveland has given for five years to the Aerial Mail and the Cleveland Aviation Club a wonderful aviation field, at City Farm, Warrensville—ten miles from the Public rensville—ten miles from the Public Square. It is aproximately one-half mile square, free from all obstruction, and only all outdoors surrounding it. It will be made one of the finest landing fields the country

The Club has opened elaborate city

clubrooms in the Hotel Statler. Active membership has grown to nearly 200 members, pilots, observers and cadets who finished ground school only being eligible. One hundred of the most representative captains of industry as Associate members is the goal for which the club is striving. Twenty-five have already been signed. A club magazine, "Wings," has just made its first appearance. Special Xmas number is being prepared. A film has been completed, "Cleveland from the Air," and will be shown on Wednesday next. A mosaic is being completed of the city of Cleveland and will be 13x7 feet.

Meetings of the club are held weekly at the Statler Hotel. The excutive offices are in the Schofield Building.



Section of the territory being prepared for landing field

# THE SIXTEENTH ANNIVERSARY OF THE FIRST FLIGHT

ORD NORTHCLIFFE cabled to the Aero Club of America on December 17, congratulating the Club on the occasion of the sixteenth anniversary of the first flight which was commemorated at the Club House at 297 Madison Avenue.

On the occasion of this anniversary the Aero Club of America and the Aerial League of America, following their custom, sent a telegram of congratulation to Mr. Orville Wright and Miss Katherine Wright, at Dayton, Ohio, and held an impromptu commemoration ceremony at the Club House where historic records and photographs of that first flight are least

The first flight was made at Kitty Hawk, N. C., on December 17, 1903. It lasted 59 seconds and covered a distance of 85 feet. Orville Wright piloted the machine which had 85 feet. Orville Wright piloted the machine which had no seat. He lay flat on the plane to eliminate the head resistance which would have been caused by his body if he had sat up as aviators sit today in piloting.

The telegram sent to Orville and Katherine Wright was signed by Colonel Jefferson De Mont Thompson, President, Aero Club of America; Rear Admiral Robert E. Peary, President, Aerial League of America; Alan R. Hawley; Henry Woodhouse; and Charles Jerome Edwards, who have been personal friends of the Wrights for over ten years—Mr. Hawley having taken Wilbur Wright, their brother, for his first balloon flight 12 years ago.

The telegram reads in part: "That first flight of 16 years

ago opened the way for the marvellous flights of the NC's and of Capt. Alcock and Lieut. Brown across the Atlantic and the recent flights from London and Paris to India, Australia and Africa. Next year will surely see flights around the world."

The Aeronautic Industry celebrates this anniversary with more orders for planes for civilian purposes than it can fill!



#### Opportunity for American Manufacturers at Cuban Exposition

New York, N. Y .-- American aero manufacturers will have an opportunity to bid aircraft contracts aggregating about \$50,000,000 during the third Pan-American Congress, which will be held at Havana, Cuba, during the week beginning February 21, 1920. V. H. Baranaco, a Cuban government commissioner now here, stated recently that American aircraft manufacturers had lost business amounting to more than \$1,000,000 from Latin-American countries during the last Latin-American countries during the last six months because of their inability to make deliveries. He quoted the case of Hannibal J. de Mesa, a Cuban sportsman, who had to purchase six French aeroplanes for the Cuban-United States Air Line because he could not obtain delivered. eries from American manufacturers be-

fore the summer of 1920.

A representative of another Latin-American republic reported that his government intended to spend approximately \$500,000 for Italian planes. Another government is placing large orders with British manufacturers because it finds it impossible to procure deliveries from the United States.

#### Sperry Instruments to Be Made in Farmingdale

Farmingdale, L. I.—Arrangements have been made here for the manufacture of Sperry Aircraft Instruments, which were heretofore manufactured at the Long Island City plant of the Sperry Gyroscope Company. The new organization at Farmingdale, known as Sperry Instruments, Inc., has exclusive rights to the Sperry air speed indicator, the turning indicator, the air distance recorder and the incidence indicator, as well as other useful aircraft instruments.

#### Personal Par

James A. Abeles, well known in the automotive field as former Vice President and General Manager of the Motor Car Equipment Company, and more recently, organizer of an eastern house for the Beckley-Ralston Company of Chicago, has recently joined forces with the Boyce-Veeder Corporation, who will manufacture and market the new Boyce Fire Extinguisher.

#### Aerial Delivery Enables Chandler to Maintain Production Schedule

New York, N. Y .-- Mr. J. B. Hulett, local distributor of Chandler cars, recently revealed how aerial delivery had enabled the Chandler Company to maintain its production schedule. Mr. Hulett stated

"Production troubles in Chicago, where sockets and plugs for Chandler head-lamps are made, caused a serious shortage recently of these small but very necessary articles. Things looked bad at first, but finally almost normal production was but finally almost normal production was resumed and everything would have been fine except for the need of fast transportation service between Chicago and Cleveland

"Efforts to get these parts through speedily enough to catch up with production were to no avail. Regular special delivery mail, railway express and even baggage were not adequate because the sockets and plugs weren't being made fast enough to permit big shipments at sufficiently frequent intervals.

"Some other method of transportation had to be found. And it was. For now these parts are coming through by aeroplane special delivery mail and this shortage has now been practically overcome.

#### Magnetic Chucks Being Widely Used

Woonsocket, R. I.—The Taft-Peirce Mfg. Company have issued a handsome catalog of their magnetic chucks, which are rapidly having wider application in industry. The Simmons Unit Pole Magindustry. The Simmons Unit Pole Magnectic Chuck is so constructed that no matter how small the material placed on the chuck is (down to one inch square) it cannot be moved in any direction without changing the number of lines of flux that pass over the work, and therefore it will oppose forces in all directions. mechanically and electrically these chucks are most carefully designed

#### SAFETY SUITS FOR OVERSEAS FLYING

In order to meet the demand for a flying suit which would protect the aviator from death by drowning or exposure the Dreadnaught Safety Suit was developed. The freedom of movement which the garment affords the wearer resulted in its selection by Captain Alcock and Lieu-tenant Brown for their transatlantic flight.

The suit is a one-piece garment made of rubberized material of the best quality. Elastic rubber wristlets and collar help to Elastic rubber wristlets and collar help to make the garment waterproof, while its closure, though simple, is most effective. Elastic high gravity fully pliable rubber composition soles keep the wearer in an upright position when in the water. The buoyancy is derived from Kapok, a vegetable form which comes from Lawrence. table fibre, which comes from Java and

the Straits Settlements and which possess seven times the buoyancy of cork. This Kapok is padded into a jacket sort of lining which is buttoned into the rubber garment.

The complete outfit consists of the rub-The complete outht consists of the rubber garment, detachable Kapok jacket lining, cap, whistle, and canvas carrying wrapper, all of which when carefully packed weighs 14 pounds, measures approximately 18 x 12 x 7, thus making a much smaller bundle than the usual cork life preserver

The Dreadnaught Safety Suit requires less than a minute to completely adjust, will keep the wearer afloat in an upright position, chest high out of water, even if unconscious, warm and dry, even amid cakes of floating ice.

The unlimited freedom of movement which corrects of feedom the reserved in

which garment affords the wearer is largely responsible for its success as a practical garment for naval aviators. The "Dreadnaught" is the most practi-

cal garment for aviators who are obliged to fly over water. This is verified by the fact that it has been tested, approved, and tact that it has been tested, approved, and is being used extensively by the Government for the various naval air stations and by the United States Army Balloon Schools. The Curtiss Aeroplane and Motor Company are keenly interested in the sale of the garment and have taken over a supply for their various branches throughout the country.

The manufacturers of the Dreadnaught

The manufacturers of the Dreadnaught suit also manufactured the non-sinkable waterproof mail bag which was used in the recent experiment of dropping mail

on the Adriatic after she left port.

The bag is made of very strong black rubberized material with a base of high gravity pliable rubber composition so as to keep it in a more stable position in rough water. Filled with mail the bag will easily float and be visible at a fair distance. The buoyancy is derived from Konak with which the bag is partly lined. Kopak, with which the bag is partly lined. A seal is easily put on the bag, taking care of locking it, so that the contents cannot be interfered with, or an ordinary padlock can be utilized to lock same.

The present size of the bag is about 20 inches high, 18 inches wide and about 8 inches deep at the base. The weight is about six pounds. The present size of the bag will hold about 500 ordinary letters, but it can be manufactured much larger and in sizes as may be required.



The dreadnaught Safety Flying Suit

Albert S. Burleson, Postmaster General Otto Praeger, Second Assistant Postmaster General B. Corridon, Superintendent, Division of Aeral Mail Servce Louis T. Bussler, Chief of Maintenanice and Equipment J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction George L. Conner, Chief Clerk, Aerial Mail Service Eugene J. Scanlon, Chief of Supplies John A. Willoughby, Operator in Charge Radio Experiments Eugene Sibley, Operator in Charge Radio Maintenance s Operation



PILOTS

John M. Miller John M., Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T . Lewis Walter H. Stevens Herbert M. Crader Charles I. Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Beliefonte Victor W. Fitch, Manager, Newark Warehouse

PILOTS

Samuel C. Eaton Robert H. Ellis James H Knight Elmer G. Leonhardt Paul S. Oakes Paul W. Smith Frederick A. Robins Frederick A. Robinson Max Miller F. A. Nutter

#### Growth in Aerial Mail Service

Washington, D. C .- A gain of approximately five-fold in air mileage, with a corresponding service in mail collections and deliveries, has been made in the last six months by the Aerial Mail Service of the Postoffice Department, according to a statement by the latter, covering air mail activities from May 15, 1919, to No-

mail activities from May 15, 1919, to November 22, 1919.

Between May 15 and November 22, this year, the Air Mail has flown a total of 305,619 miles, or more than the distance of twelve times around the world. During the six months preceding, air mail planes flew but 61,173 miles. The aston-

ishing gain is explained by the fact that on May 15, 1919, was inaugurated the New York-Chicago air mail route, an air line of 710 miles, navigated once daily in each direction. Prior to this extension the sole air mail line was from New York to Washington, a distance of 218 miles, navigated then as now once daily in each navigated then as now, once daily in each direction.

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-CHICAGO ROUTE

Monthly Report of Operation and Maintenance SEPTEMBER, 1919

					'uel,			P						SER	VIC	E ANI	UNIT	COST	
Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallons of Gasoline	Total Time	Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
12 40A 64 65 66 67 70 71 72 73 74 75 76 77 79 81 83 85 87 88 99 91 92 93 94 95 97 110 24227 44301	\$13.40 291.69 260.64 57.11 162.66 181.13 379.58 212.04 3379.58 212.04 307.85 242.38 254.82 56.34 3.00 36.56 257.43 88.13 73.27 251.68 215.51 342.63 55.94	\$7.23 45.72 38.84 11.55 24.23 32.93 54.20 31.80 60.95 5.00 40.60 30.21 39.43 20.60 8.00 19.44 5.05 28.91 12.60 7.15 37.21 25.23 52.84 9.00 40.02	\$39.60 52.80 52.80 52.80 52.80 52.80 52.79	\$41.38 41.39 41.39 41.39 41.39 41.39	\$11.44 11.44 11.44 11.44 11.44 11.44 11.44 11.44 11.44 11.44 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45 11.45	\$88.42 104.05 104.05 104.05 104.05 104.05 104.05 104.05 104.05 104.05 104.05 104.05 104.06 104.06 104.06 104.06 104.06 104.06 104.06 104.07 104.07 104.07 104.07 104.07	\$64.08  225.22 236.52 51.88 117.19  183.07 278.55 150.64 342.70  101.64 23.51 293.24 177.87 255.94 83.55 25.86  51.28 219.24 53.68 171.58 277.00 11.84	\$79.60 25.46 293.61 142.74 102.01 137.67 249.47 245.18 236.61 186.60 247.77 139.28 176.00 85.03 193.68 143.81 233.11 127.96 137.30 122.54 88.095 138.09 127.95 193.89 75.58 124.02 102.266 116.99 28.31	\$5.81 76.50 104.45 16.60 19.21 58.60 45.03 13.68 157.92 15.17 136.52 174.02 158.77 75.00 27.06 65.22 32.58 103.58 5.00 27.08 44.48 26.960 185.26 31.58 93.70 11.40 125.49 61.73 25.96 18.64	\$34.68 75.00 50.00	\$58.82 78.43 78.43 78.43 78.43 78.43 78.43 78.43 78.43 78.42	\$444.46 465.06 1.298.79 1.033.44 579.86 838.45 632.60 994.09 1.444.95 934.34 1.522.63 575.89 841.84 1.139.59 997.58 1.153.98 681.39 571.98 488.08 541.12 1.121.87 862.99 754.53 1.100.66 916.21 1.298.18 503.90 503.65 478.18	147	32 34 7 17 26 40 21 50  14 3 26 37 11 3 37 11 3 37 7 4 4 36 40 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	13 59 39 25 03 46 51 59 29 59 14 01 00 31 59 33 16 17 37 45 51 16 30 31 31 31 32 33 33 33 33 34 35 36 37 37 48 48 48 48 48 48 48 48 48 48	657 3,399 2,997 650 1,684 4,374 2,310 5,322 950 343 4,166 2,355 3,310 930 335 645 2,955 2,169 3,849 1,133	4.5 3.4 3.2 2.9 4.2 3.3 3.9 5.1 3.8 3.7 4.6 3.2 2.9 1.7 1.1 5.9	\$48.00 39.00 29.40 78.00 48.60 36.60 34.80 42.60 30.00 57.00 150.00 26.40 37.80 30.60 56.40 33.60 112.80 112.80 112.80 30.60 56.40 33.60 113.80 335.40 335.40	\$0.67383489493733402888 1.41
Total	\$4,362.20	\$ 685.29	\$1,599.66	\$1,324.27	\$366.24	\$3,223.54	\$3,819.80	\$4,815.64	\$2,128.57	\$1,514.58	\$2,376.25	\$25,216.14	15,016	560	01	51,630	3.4	\$45.00	\$0.51

#### The Hild-Marshonet Sportplane



THE Hild-Marshonet Sportplane was designed to meet the needs of the public for a moderate price aeroplane, built of the best materials and workmanship, and possessing numerous features to make the plane very desirable. There are 10 years of aeroplane engineering and experience back of it.

*
General Characteristics.
Spread over all 24'0"
Spread over all
Height 7'0"
Weight, empty450 pounds
Weight, loaded with pilot
and fuel for 3 hours700 pounds
Speed range35-65 miler per hour
Climb
Glide 8 to 1
Factor of safety through-
out 7
Total Wing area inc. ail-
erons :
Area of Ailerons 13 sq. feet
Area of Stabilizer 6 sq. feet
Area of Elevators 11 sq. feet
Area of Vertical Rudder 6 sq. feet
Area of Vertical Fin 3 sq. feet

shown by ings is powered with a 2-cylinder, air cooled 20 H.P. motor. The Second cooled 20 H.P. motor. The Second model, similar in every detail will be equipped with a 4-cylinder, water cooled motor, weighing 135 pounds, and developing 40 B.H.P. at 1100 R.P.M. This motor was designed by Mr. James C. Spainhour, M. E., who made a number of successful flights with the motor in 1914, and found it thoroughly satisfactory. Mr. Spainhour has become assofory. Mr. Spainhour has become associated with Hild and Marshonet in the manufacture of the aeroplanes, and as a result, the motor will shortly be placed in production, and will be used exclusively as the motive power for both the single and two seater-machines.

The upper main planes are set at a retreating angle, with no dihedral, have a chord of 5'0" at the body, and 3'0" at the tips, the curvature and depth of the

ribs changing to suit the chord. erons are hinged in the usual manner to the rear wing beams at the outer ends.

The lower main planes are set at an advancing angle to the body, where the chord is 4'6" and taper gradually to the edge, as in the upper wings, to a chord of 3'0". The lower planes are set at a dihedral angle of 6 degrees.

N.P.L. No. 4 wing curve having been

found most advantageous, was adopted. It gives a high lift, and good L/D at the angle of 4 degrees at which wings are set. It also allows sufficient depth for wing beams, and a high factor of safety.

the extreme end of the entering edge of the lower wings this angle is reduced to 12 degrees. This arrangement of wings in addition to providing considerable stability, both longitudinal and lateral, provides unexcelled observation of the ground for the pilot, especially desirable in alighting, the wheels of the machine are always in view, thus permitting safe landings

A single interplane strut is used, built up of two layers of 3 ply veneer, reinforced through the center with a beveled spruce strip, and reinforced on the edge with aluminum, all securely riveted to-



Side View Hild-Marshonet Sportplane

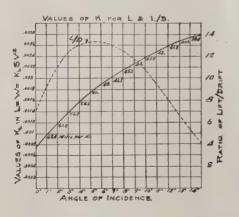
The wing beams are of spruce I beam section, and are of "A" formation, that is the front and rear beam in each wing meet at the outer wing ends and are se-curely bolted together, causing great strength and stiffness, preventing twist-ing of either wing beams or of the wing

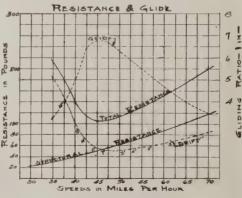
The ribs are made of basewood, to which the cap strips of spruce are fastened with brass wood screws. The cloth is sewn onto the wings and treated with coats of Dupont Dope, and then var-

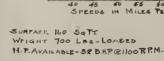
It may be noted that the angle of stagger at the body is 40 degrees while at

gether, and causing good streamline section. The steel wing hinge fittings are also riveted to the strut.

There are two flying cables and one landing cable on each side, of 3/16" diameter. No turnbuckles are used. On the rear pylon, above the pilot's head, and within easy reach, a cable release lever is within easy reach, a cable release lever is fastened, to which are secured the upper ends of the flying cables. By releasing the catch on this lever, the pilot may relieve the tension on the flying cables, upon alighting, and within ten minutes, can remove, alone, the four main planes from the body, permitting the aeroplane to be stored in a small barn or building







P 25

I

PRELIMINARY PERFORMANCE CHART



9'0" wide. Reassembling of wings to body, would occupy not more than 12 minutes time for the pilot alone. The interplane strut folds against the surface of the upper plane and there secured by a catch.

The fuselage is built up of 3 ply veneer, and reinforced with aluminum and steel partitions, riveted securely to the veneer, possessing great strength. The cowling is of aluminum, reinforced with steel braces which are also attached with bolts to the fuselage.

The landing chassis is of steel tube

throughout, streamlined with wood pairing, and wrapped with linen. It is held together by a cross tube in front of the axle, and by diagonal bracing in the front bay only.

The axle is ½" in diameter, and the wheels shown are 20" x 2", these will be replaced with 26" x 3" wheels.

The stabilizer is set at an angle of 0 degrees, and is 18" above the fuselage, is built up of spruce. Both rudder and elevators are built up of steel tubes and wood ribs. The vertical fin is attached

below the stabilizer, the steel tube used in its construction, supports the front edge of stabilizer, and the lower end passes through the fuselage. The control cables are in duplicate, are

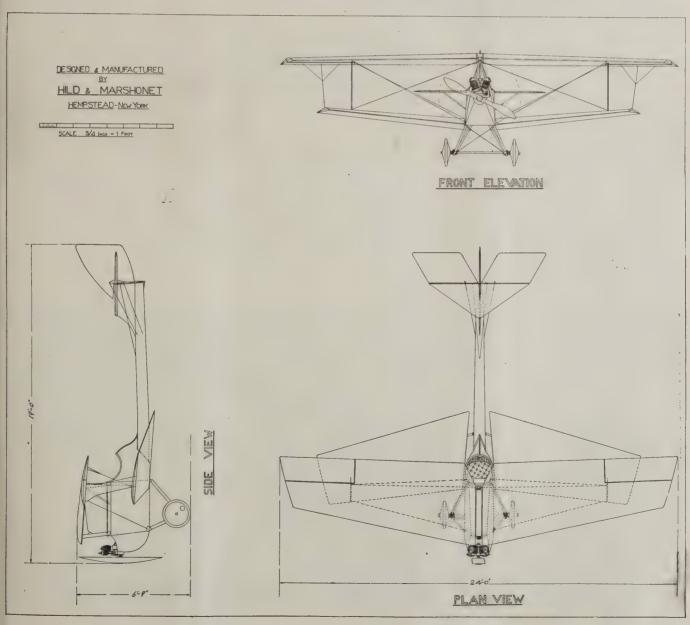
so arranged as to pass through the fuse-lage, those for the rudder coming out through copper tube guides on the top, and those for the elevators, on the sides of the fuselage.

The skid at the extreme rear end is a composition of steel and rubber, 6" deep, and acts as a break in alighting, causing the machine to make a quick stop.

The cockpit is upholstered, and a cushion provided for the seat. In getting in and out of the aeroplane the pilot needs only to step onto the fuselage back of the seat, and from there to the ground another step of only 18", an ideal arrangement for ladies.

The fuel consumption is 5 gallons an

It is planned to place both the single seater and two seater machines in production at an early date, and although it is impossible for the manufacturers to quote accurate prices at this moment, they have hoped to set \$2,000 and \$2,400 as the price of the single and two seater machines respectively.



#### TITE-FLEX METAL TUBING

All commercial flexible tubing is rolled from strip metal, and turned over in passing through the dies so as to make an interlocking Joint

The flexibility in full or semi-interlocked tubing is obtained from the *sliding* action of the joint parts, one on the other, *within the joint*, the coil remaining rigid.

The flexing in Tite flex, as distinguished from that in "interlocked" tubing, takes place within annular diaphragms which are substantially at right angles to the axis of the tube and formed by the sides of the U-shaped convolutions that are characteristic of the Tite flex section. The interlocking portions comprising the seam are compressed under heavy pressure to make a continuous permanently tight cold-welded structure. The seam is to all intents and purposes virtually solid metal. metal and the seam is primarily self-tight—not "semi-tight" or "near-tight" or depending in any way upon additional pro-The flexibility is therefore entirely in the vision for tightness.

Packing is the sole reliance for tightness and any of the known commercial forms available for tube construction rapidly disintegrate and the recurring movement of the joint soon wears the packing out. Gasoline and steam are especially active in its destruction and other methods are resorted to in order to provide an apparently reasonable life, such as a casing outside or a lining within. An inside lining is subject to early deterioration, causing particles to loosen and peel, stopping the flow and contaminating the fluid.

An outside casing soon becomes permeated, if gasoline is conveyed and a steady loss of fluid results and in addition a dangerous fire risk is created. Steam has a detrimental effect on an outer casing and when leakage from the inside once starts, cracks formed as the result of the baking process hasten the penetration and destruction.

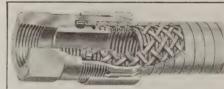
Tite flex being permanently self-tight and free from any internal rubbing action, will show no appreciable deterioration after long periods of use that would impair the tightness of any construction of interlocked tubing. The absence of or-

ganic material that can be detached enwithout impairment of its tightness. It can withstand considerably higher temperatures without damage than ordinary rubsures the purity of the fluid and as the metal is not solvent or destructible the original capacity and reliability are maintained

In contrast to interlocked tubing, due to frictional drag and limited play in the joints, Tite flex has a soft springy action. It bends willingly, and instead of retaining a "set" tends of its own accord to return to normal position when released. The construction of Tite flex tubing permits of bending the tube to a diameter less than that of any interlocking tube of the same diameter. If accidently bent too far, Tite flex tubing is readily straightened out ber hose.







Upper left: The flexing of Titeflex tubing takes place within annular diaphragms at right angles to axis of the tube. Upper right: In the case of interlocking tubing, flexing is obtained by the sliding action of the joint parts. Lower; Armored Titeflex tubing with heavy sheathing for extremely rough usage

The bursting strength, in the usual construction, is limited by resistance to blow out of packing, lining or casing and is decreased by bending and joint wear. An examination of the construction of Tite flex reveals the fact that the circumferential reinforcement in the ribs formed by four overlappings of metal is ample to

withstand all reasonable strains. Several navy yards and private ship builders, utilizing 1,800 pounds water pressure in independent pump type hydraulic jacks have found this type of tube to give continuous satisfactory service.

In a test recently completed a 1 5/16 in. brass Tite flex tube was put under 120 pounds air pressure, sealed at both ends and permanently connected to a pressure gauge. At a temperature of 70° no change in the pressure reading of the gauge could be detected during the period of the test, which lasted one year.

The placing of much metal in the direct line of crushing stress makes Tite flex strongest in this respect where interlocked tubing, having its strength at right angles to, instead of in the line of pressure, is weakest.

The extreme resistance to crushing was demonstrated on a 10-inch length of 34-inch brass Tite flex Tubing which was used as a roller between two iron plates, the upper one of which was loaded with 2050 pounds of steel. No permanent distortion resulted.

The extreme strength of Tite flex construction admits of the use of very thin metal, which gives a weight per foot that is much less than that of any other metal or cumbersome and stiff combination hose that will do equal work, thus making Tite flex very easy to handle even under pressure.

Tite flex tubing may be used without any special covering, but in cases where it is subjected to pressure it is protected from elongation by a tubuar braided casing of flat narrow gal-

lar braided casing of flat narrow galvanized strip steel tape or wire, which tend to grip the tube tighter as pressure increases.

In cases where extremely rough usage, heavy exterior wear and accidental bending on short radius is encountered, armored hose serves as a complete protection.

Numerous types of coupling are applicable to Tite flex hose for any service to which it may be put. The tubing is made in brass or steel, for use as strength requirements may dictate.



O Wide World Photos

# MODERN WING COVERINGS—MATERIALS USED AND THEIR APPLICATION

By R. G. DORT, A.M.

(Continued from page 335)

#### Other Dopes

Certain other combinations of substances than the above have been suggested and tested as dopes. They are such substances as glue sizings and certain corn products. None have been found to be really satisfactory, the chief faults being lack of adhesive power, lack of tautening power, and in some cases water solubility.

#### Pigmented Protective Coverings

To ensure adequate performance of the wing coveringperformance from the point of view of lasting and weathering qualities as well as speed and climb—the use of a piging qualities as well as speed and climb—the use of a pigmented protective covering is essential. One of the main reasons for their use is to protect the fabric and dope from the action of the actinic rays of light. In 1917 the British in a report from the Royal Aircraft Establishment by Dr. Aston showed that unprotected doped fabrics (and undoped cloths as well) lost very appreciably in tensile strength after three months or even less exposure. Following strong representations made on the subject by the Technical Section, Air Service, A. E. F., based largely on current British practice, pigmented protective coverings were required in the United mented protective coverings were required in the United States on all planes going to the front. This was later made to include all U. S. Air Service planes—training and combat alike.

Another, and no less important effect, which pigmented protective coverings seem to have, is that of keeping the wing covering at more constant tautness under varying degrees of temperature and humidity. The statement is based on experimental and practical results both here and in England. The reason for this effect is not as yet fully proved or clear. Probably it has something to do with the pigment retarding the penetration of water waper through the deep film into the

Thousany it has sometime to do with the pignient retarding the penetration of water vapor through the dope film into the cloth and hence preventing "slacking off."

Two minor reasons for the adoption of pigmented protective coverings of the color used by the Air Service were camouflage and uniformity in coloration with the other allied

planes.

In commercial work pigmented protective coverings of the proper type are even more essential than in combat planes. The life of a combat plane on active duty is, in any case, very short. It has been sometimes questioned whether or not it paid to put so much care into the manufacture of wings of army planes. Commercially the normal life of the plane ought to outlast that of the earlier wing coverings. With proper modern materials and application, wing covers ought to be the last plane part to be replaced. A very important factor in bringing about this condition is the use of a suitable pigmented protective covering.

#### Types of Pigmented Protective Coverings

Two types of pigmented protective coverings have been used largely here and in England. The more satisfactory are used largely here and in England. The more satisfactory are those protective coverings of the so-called dopes type. Enamels—pigmented oil varnishes—have been used here and in England as well for reasons noted below. In addition to these, work is being done now on the pigmentation of acetate dope with success in view. This would obviate the necessity of a separate pigmented covering—as all dope coats on the wing would be pigmented. wing would be pigmented.

#### Pigmented Protective Coverings of the Dopes Type

Pigmented protective covering of the dopes type will be found most satisfactory from all points of view-far more so "dopes type" because they are in general made of nitrate dope, heavily pigmented—thereby cutting down the fire hazard practically to that of acetate dope—with suitable softeners such as castor oil. A familiar example is the satisfactory British P. C. 10.

Protective coverings of the satisfactory of the sa

Protective coverings of the dopes type have two great advantages over those of the enamels type. First, they dry in rom twenty to thirty minutes as opposed to eight to twelve hours for the pigmented oil varnishes. Second, they have, by actual measurement, a slight tautening effect on the wing cover as opposed to the tendency which some of the enamels have to slack off the wing covers. (See below.) The first of these advantages is of considerable importance with relation to the total time required to produce a complete plane—especially under production conditions. The second is of great importance when some of the troubles encountered in the past

are considered.

For combat planes an important advantage of pigmented coverings of the dopes type is the ease with which a completely matte surface may be obtained with this material. This is highly important from the camouflage point of view the elimination of all flash or direct reflection from the wing surfaces when in flight. Commercially this is not, probably, so important, although some pilots have expressed themselves as strongly in favor of very flat finishes on the wings of all planes owing to the eye strain of the brilliant glare from the wings under some conditions of sunlight and flight.

Generally speaking, the adhesion of the dopes type of pig-

mented protective covering to the dope layers underneath is better than that of the enamels type. No trouble has been had in this respect with the former type of covering, while the pigmented oil varnishes have been found occasionally

to peel.

The only objection to the use of a pigmented nitrate dope in this way is the slightly greater inflammability a film of this material generally has over an acetate dope film. As has been noted above, the normal inflammability of a nitrate dope film is much cut down by the pigments—largely yellow ochre—and by proper fireproofing mediums. This, coupled with the fact that there will be at most only two coats of this slightly more inflammable medium over four coats of acetate dope, makes the use of a pigment of the site of the pigment of the p makes the use of a pigmented nitrate dope in conjunction with

Satisfactory pigmented protective coverings of the dopes type are made by three firms in the United States. One of these products is satisfactory in all colors. The other two have, so far as is known, developed a satisfactory product only in the standard khaki shade.

#### Pigmented Protective Coverings of the Enamels Type

Enamels or pigmented oil varnishes have been much used both here and abroad as pigmented protective coverings. are not so satisfactory as coverings of the dopes types for the reasons noted above. Not only is the long drying time serious, but the slackening effect, which some of the enamels used in this country have had, is distinctly bothersome. This slackening effect was probably due to the use of an excess of turpentine in the enamel. It is well known that certain substances designated chamically as ginerated acceptances for stances, designated chemically as pinenes, are softeners for a

stances, designated chemically as pinenes, are softeners for a cellulose acetate film—i. e., they cause it to soften, and hence stretch. These substances can under certain conditions, of which time is a factor, develop in turpentine. The result on the tautness of the wing cover is obvious.

Minor disadvangtages from the use of the enamels type of coverings are the great difficulties attending the procuring of matte surfaces with pigmented oil varnishes. It is very difficult, if not impossible, to obtain a flat finish with an ename of this in relation to military planes and The importance of this in relation to military planes and camouflage has been touched on above.

Enamel coverings are manufactured by most of the important varnish and paint makers of the country. Many of the above faults, predominant in the early products, have been in a measure gotten rid of. But the arguments for the use of the dopes type still hold good.

A word as to why the enamels type of pigmented protective

A word as to why the enamels type of pigmented protective coverings were used at all may be pertinent. The British coverings were used at all may be pertinent. The British were forced to use the enamels type owing to the great shortage of raw materials of which to make pigmented coverings of the dopes type. Correspondence and cables in the War Department files show conclusively that the British used enamels not from choice, but from necessity. In the United States the lead was taken from the British. In any case no pigmented dopes were manufactured in this country. Some difficulty was had in securing proper formulas and more diffidifficulty was had in securing proper formulas and more diffi-culty in having them tried. Finally, however, in the fall of 1918 production of coverings of the pigmented dopes type was begun here. Their use is now required by the Air Service.

#### Pigmented Acetate Dopes

The development in pigmented protective coverings which is confidently looked for is the abolition of a separate pigmented covering and the pigmentation of all coats or dop—i. e., the use of a pigmented acetate dope for all coats. The advantage from the production point of view is obvious. The difficulty has been to get proper balance between dope, pigments and softeners, so as to get proper tautness, non-trans-

# LAWSON

Creator of Advanced Aircraft
There has never been a person hurt in a Lawson Airplane
Facts are better than fancies



THE first 26-passenger-carrying Lawson Air Liner passing over New York Harbor, as photographed by an accompanying airplane. This ship made a successful test flight trip from Milwaukee to New York and Washington and return — a distance of 2,500 miles, carried passengers all the way and broke almost every world's record for big ships.

All Lawson aircraft, whether commercial, military or sporting types, are planned, designed and built under the direction of Alfred W. Lawson, the well-known aeronautical expert, who has had 12 years of all round practical experience in aircraft work.

LAWSON TWO ENGINE 26-PASSENGER CARRIER
LAWSON THREE ENGINE 32-PASSENGER CARRIER
LAWSON TWO ENGINE MAIL CA—CARRIES 3,000 LBS. MAIL
LAWSON THREE ENGINE MAIL CAR—CARRIES 4,000 LBS. MAIL
LAWSON STEEL BATTLER—CARRIES 8 MACHINE GUNS

#### LAWSON AIRPLANE COMPANY

Milwaukee, Wisconsin, U.S.A.

# LAWSON

Creador de una Navegacion Aerea Avanzada.

No ha habido nunca una persona lesionada en un aeroplano Lawson. Los hechos son mas poderosos y contundentes que toda fantasia.



L primer aeroplano de la linea Lawson conduciendo 26 pasajeros, pasando sobre el puerto de Nueva York. Esta foto grafia fué tomada desde otro aeroplano que lo acompañaba. Este aeroplano hizo un viaje espléndido desde Milwaukee a Nueva York y Washington, ida y vuelta, una distancia de 2500 millas. Llevó pasajeros durante todo el viaje y rompió casi todos los records establecidos en el mundo por buques aéreos de gran tamaño.

#### LINEAS AEREAS ESTABLECIDAS Y FUNCIONANDO

Todos los aeroplanos Lawson, tanto comerciales, y militares como de paseo "sport" son ideados, diseñados y construidos bajo la direccion de Alfred W. Lawson, el bien conocido experto aeronáutico, que cuenta con mas de 12 años de práctica constante en la construcción de buques aéreos.

Lawson de dos máquinas, con capacidad para 26 pasajeros.

Lawson de tres máquinas, con capacidad para 32 pasajeros.

Lawson de dos máquinas para el correo con capacidad para 3000 libras de correspondencia y materia postal.

Lawson de tres máquinas para el correo—Capacidad 4000 libras de correspondencia y materia postal.

Lawson de guerra blindado—Lleva 8 ametralladoras.

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Milwaukee, Wisconsin, Estados Unidos de America

parency and adhesion. Experimental results so far attained give promise of speedy development.

406

#### Summary

The materials of which a wing cover should be made in order to get satisfactory results are, in the order in which they are used in production, as follows: Cloth—Grade A cotton or linen, or the 3.5-ounce cotton, or the 7-ounce cotton for certain special planes or uses. Reinforcing tape,—special heavy cotton tape with strength in the direction of the warp. Lacing cord,—a corded cotton of 20-3ply 3ply 3ply, of 20-3ply 4ply 3ply, or a linen at least nine cord. Finishing tape,—any fairly close weave cotton or linen cloth, strips of rejected wing cloth, with frayed edges, or edges, if pinked with scallops not less than twelve to the inch. Dope,—a cellulose acetate dope of a formula to prevent blushing; U. S. Standard No. 5 is recommended. Pigmented protective covering,—one of the pigmented dopes type is recommended for wings and insignia.

The above materials properly applied will give a wing covering the equal of any made to-day here or abroad. If the workmanship of the application is not good, the results will not, naturally, be satisfactory no matter what the materials. Certain recommendations for the use of the materials will

#### PART II

#### The Application of Wing Covering Materials

Of equal importance with excellence and suitability of wing covering materials is their application. Unless properly handled from the points of view of engineering and workmanship, the results from the use of the perfected materials be-fore described may be far from that desired.

The application of modern wing covering materials will be discussed under the two heads of fabric application and dope application. The first will include the treatment up to the point where the dope is applied. The second will deal with the application of the dope and the pigmented protective covering—thus completing the wing cover.

#### Fabric Application

The standard fabric application methods of the U. S. Air Service are yet to be improved on. Followed in detail they will give a wing cover which will meet successfully the severest conditions. The Air Service specification for fabric application is 24108-B. A few minor changes have been suggested (such as the use of certain types of cloth) and will be made as this discussion progresses.

suggested (such as the use of certain types of cloth) and will be made as this discussion progresses.

Cutting of the cloth of which the tover is to be made should be done by an electric cutter on a table of a length such that at least thirty-yard lengths of cloth may be laid out on it. According to the production desired, twenty-five to one hundred layers of cloth may be laid out and cut at once. Patterns of heavy paper with lines of small holes where the cuts are to be made are convenient. A stendil of this nature. cuts are to be made are convenient. A stencil of this nature, dusted with colored chalk, gives good results.

It is obvious that these patterns should be so planned that as little waste cloth as possible is left for scrap. It is essential that they be so designed that when the pieces are sewed together the warp threads of the cloth on the covered wing will be parallel to the line of flight—i. e., that the seams will be parallel with the ribs.

If the envelope method of application of the cover to the wing be used—and, as noted below, it is strongly recommended that this method be used—the cutter's job is one of great importance, only superseded by the care necessary in marking out the patterns. For the covers, when sewn, must fit the wing framework very tightly, and yet be large enough to be drawn over without undue stressing of the seams and fabric. In the envelope method there is no opportunity to tighten the cloth on the wing other than by the effect of the tighten the cloth on the wing other than by the effect of the dope. And as has been proved many times, a wing cover too slack before doping, will never be brought up to a satisfactory tautness by doping. Hence the importance of accurate and tautness by doping. Hence to careful cutting of the covers.

The use of the so-called envelope method of application is strongly advised. In this method an envelope or bag is made strips of cloth so that leading edge, trailing edge and

of the strips of cloth so that leading edge, trailing edge and wing tip are sewed by machine, thus leaving only the edge butting against the fuselage to be sewed or tacked after the envelope is drawn over the wing. The aileron recess also is generally left unsewn to facilitate drawing on the wing cover. For quantity production the advantages of this method are numerous. When properly cut, all wing covers will be of uniform size and proper tautness for doping. The major portion of three sides of the wing will be machine sewnthus cutting down the labor after the cover is on the wing. Sewing of the trailing edge is at best a tedious, fussy job.

Eliminating it is a distinct advance. There are disadvantages as well. As has been emphasized above, the designing of the patterns must be most carefully done, and the cutter must follow these patterns with great care. In some plants it has been felt that pulling of the cloth bag over the wing is very hard for the workman. Certainly it requires some strength, but probably not so much as pulling the cloth to close the trailing edge (in the other method of application) and holding it while sewing. Men wearing rubber gloves should pull the covers over the frameworks. It is emphasized that the covers should be drawn to give them as much tension laterally as is present in the direction parallel to the line of flight.

The envelopes should be machine sewn on all sides except that which is next the fuselage and the aileron recess. The seams should be folded-ply seams. It is convenient, though not absolutely necessary, to use a double-needle sewing machine with a folder-feller attachment. The thread used chine with a folder-feller attachment. The thread used should be of silk. A three-strand thread having a tensile strength of at least three pounds, when tested as a single thread without knot, is recommended. It has been suggested that for the double-needle machine a left and right hand twist for the two needles respectively is an advantage, to reduce the tendency of the thread to "fuzz up" as fed to the needles.

There should be ten seam stitches to the inch. No larger needles than are absolutely necessary for either machine or hand-sewing should be used.

Hand-sewing of the aileron recess and the fuselage end of the wing should not be done with silk. Hand-sewing with the wing should not be done with silk. Hand-sewing with silk is very unsatisfactory owing to the constant snarling and fraying of the thread. Linen thread of weight known as 30 Lea should be used. This thread should be of three strands, and have a tensile strength of at least fourteen pounds when tested double and without knot.

The pulling on of the envelope to the wing framework has been touched on above. As has been noted, since considerable strength is needed, it is recommended that men be used in this operation. Lateral tension should be as great as that in the direction parallel to the line of flight.

Difficulty will be encountered where the cap strips of the

Difficulty will be encountered where the cap strips of the ribs are not smooth. Where glue sizing has been used to protect the cap strip from the soaking through of the dope this is sometimes met. It can be overcome only by having the cap strip and its protecting medium smooth. It is of course entirely impossible, as well as poor workmanship, to attempt to cover a wing by the envelope method until the varnish on the wood—especially on the cap strips—is absolutely hard. It is practically impossible to use the envelope method efficiently when the plane is designed to have a Pitot tube projecting from the leading edge over a half inch. This situation is met by having a pipe connection set nearly flush with

tion is met by having a pine connection set nearly flush with the wood of the leading edge.

Hand-sewing or tacking may be used to complete the cover in the aileron recess and along the fuselage edge. Whichever is used, the securing of the cloth should begin where the machine stitching stops. Sewing should be done with linen thread mentioned above. Tacking should be done only with galvanized or brass tacks of a length suitable to the thickness of the wood. It is emphasized that dope does not protect metal from rust—dope films are permeable to water vapor. Hence unprotected steel tacks will rust with the well-known resultant deleterious action on any cloth with which the rust comes in contact. If in the hand-sewing, temporary tacks have been used to maintain tautenss, these must be removed by a straight pull so as not to injure the cloth. A better by a straight pull so as not to injure the cloth. A better scheme, and one used in some factories, is the use of small wooden blocks and nails to hold the cloth tight while being sewn. Fewer of these are necessary than tacks to serve the same end. They are much less likely to injure the cloth.

When tacking is used to complete, permanently, the application of the cover, the cloth should be brought over the back surface of the spar and tacked under proper tension on the

next adjoining surface.

If the older method of cloth application be used, the cloth is sewn by machine only on the leading edge and generally on the wing tip. The semi-envelope thus formed is placed on the wing and secured in place under proper tension by sewing and tacking. The trailing edge of the cover should not be tacked. Hand-sewing with the thread recommended above should be used. The aileron recess and the edge of the cover next the fuselage may be either sewn or tacked in the manner described above.

#### Cloth Tension

Whichever method of cloth application has been used, the tension of the cover before doping should be very good. This is particularly important when a cotton cloth is used. Much of the dissatisfaction heard with respect to the use of (Continued on page 418)

# RESISTANCE OF NAVY NO. 1 STRUTS

By A. F. ZAHM, Ph.D. Bureau of Construction and Repair

REFACE.—The tests herein described were made to de-PREPACE.—The tests herein described were made to determine the resistance of four Navy No. 1 aeroplane struts, and their resistance coefficients in terms of the air speed and thickness. The measurements were made in the 8' x 8' tunnel at speeds of 20 to 70 miles an hour. The test was conducted by Mr. R. H. Smith; the computations and drawings were made by Mr. M. T. Birch, both assistants in the aerodynamical laboratory.

Description of Struts.—The struts were of uniform size from end to end, were all five feet long, had a fineness ratio of three to one, and had the shape of section specified in Plate I. They were all of pine, shaped to metal templates and varnished. Their nominal thicknesses were respectively 1", 2", 3", 4". The dimensions of all the struts, except the largest, conformed to specifications the latter being about 10' too. conformed to specifications, the latter being about 1% too thick. This excess was ignored in tabulating and plotting the resistance values.

Method of Test.—Each strut in turn was held upright on two prongs pointing upstream from the shielded spindle of the Eiffel balance. The center of the model was at the axis of the tunnel, and its chief plane of symmetry was parallel to the side walls. The resistance was measured as usual; first with the strut and holder; then with the strut detached but not removed. The resistance of the holder alone was about 1 per cent. of that of the small strut.

Method of Computing Resistance Due to Pressure-Drop .-

Method of Computing Resistance Due to Pressure-Drop.—As may easily be shown, the pressure-drop resistance of a strut of uniform section can be expressed by the formula:  $Rp = 21 \int p \ dy$  in which 1 is the length of the strut, p the static pressure along the axis of the unobstructed tunnel, and y the half thickness of the strut at successive offsets, the integration extending from front to rear of the model. For the pressure on any element of the strut surface is p 1 ds, which resolved along stream is p 1 ds. dy/ds = p 1 dy, the integral of which is as above. The same result obviously follows if p is the pressure-drop in the unimpeded stream along the center line pressure-drop in the unimpeded stream along the center line of the strut. This pressure-drop and its graphic integration over the four strut surfaces are presented in Plate III for a speed of 40 miles per hour. For higher speeds the pressure-drop is assumed to increase as the square of the speed. This assumption may, as indicated by some tests still in progress, entail an error of a fraction of 1 per cent. of the total strut registrates.

The Resistance Coefficient.—The resistance of a uniform strut held transverse to a uniform current parallel to its plane of symmetry may be written

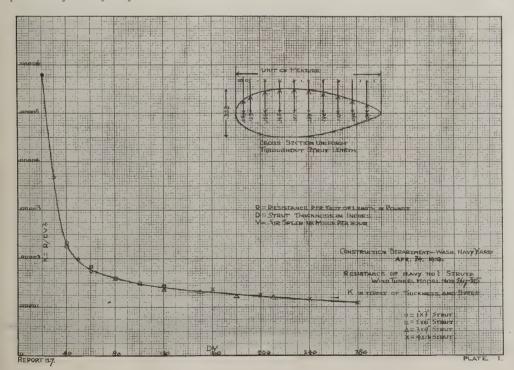


TABLE I

	10	merarenda or	strute of s	IMILET 8801	tion.						
Air speed in m.p.h.	Measured resistance.	Resistance due to pressure- drop.	Bet total resistance.	Resistance R		K = B					
		1" x	3" strut								
20 30 40 50 60	0.1169 0.1863 0.1907 0.2518 0.3220	0.0004 0.0012 0.0020 0.0032 0.0044	0.1165 0.1656 0.1887 0.2486 0.3176	0.0228 0.0531 0.0377 0.0497 0.0685	80 80 40 60	0.0000562 0.0000568 0.0000235 0.0000198 0.0000176					
	2" x 6" strut										
20 80 40 50 60	0.0926 0.1675 0.2630 0.3816 0.5230	0.0018 0.0040 0.0074 0.0112 0.0166	0.0908 0.1655 0.2556 0.3704 0.5064	0.0182 0.0831 0.0511 0.0741 0.1018	40 60 80 100 120	0.0000288 0.0000184 0.0000160 0.0000148 0.0000141					
		5" x 9'	'etrat								
40 50 60 70	0.3465 0.5160 0.6815 0.9380	0.0158 0.0238 0.0356 0.0484	0.3307 0.4922 0.6459 0.8896	0.0661 0.0984 0.1292 0.1779	120 150 180 210	0.0000138 0.0000131 0.0000120 0.0000121					
4" x 12" strut											
40 50 60 70	0.4755 0.6735 0.9020 1.1500	0.0268 0.0404 0.0602 0.0820	0.4487 0.6331 0.8418 1.9680	0.0897 0.1266 0.1684 0.2136	160 200 840 280	0.0000140 0.0000127 0.0000117 0.0000109					

R = Realstance per flot of length.in pends. D = Strut thickness in inches. V = Air speed in miles per hour.  $\frac{2}{6}$  = .00512.

$$R = \frac{\rho}{g} 1 D V^2 f \left(\frac{D V}{\nu}\right)$$

in which  $\stackrel{\rho}{-}$  is the fluid density, 1 the length, D the thickness,

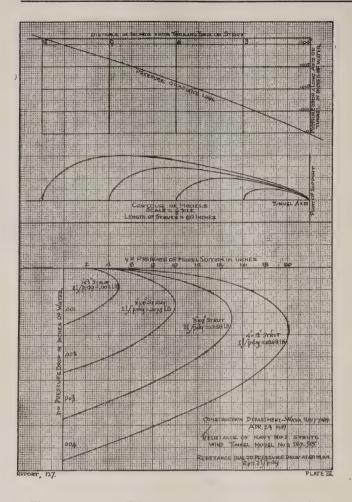
V the speed, v the kinematic viscosity. Though, for constant fluid conditions, f may tend to become constant for the higher values of DV found in aeroplane practice, it usually varies considerably for the lower values. For convenience in obtaining and using a working formula, the above equation is written  $R = K \ D \ V^2$ 

in which R is the strut resistance per foot length in pounds. D the thickness inches. V the speed in miles an hour,

and 
$$K = \frac{\rho}{g} \left( \frac{D V}{\nu} \right)$$
. Since the

wind-tunnel data are for standard air conditions, K is a function of DV, for similar struts, and R is pounds resistance per foot run for air of standard density, here taken as .07635 pounds per cubic foot.

When K, so derived, is used in computing the resistance of struts for a similar air movement, some correction must be made for end effects, unless the model be geometrically rather than just sectionally similar to said struts. In the present account the end correction is omitted, for lack of sufficient data. It may, how-ever, by inference from well-known experiments, be regarded as small:



The resistance coefficient may also be writted in the dimensionless form

 $C = Rg/\rho 1 D V^2$ 

in which R is the observed resistance, 1D is the projected area, and -1 D V2 is the Newtonian resistance of this area.

Thus C is a shape coefficient, independent of the units employed, and is called the "absolute coefficient.

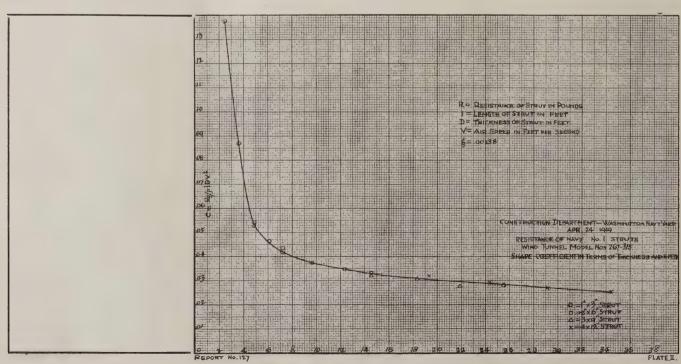
Results.—Table I gives the gross and the net resistance of the four struts at various speeds; also the coefficient of resistance K for the conditions therein specified. Plate I shows the relation of K to DV for the tabulated conditions. The data all lie close to a continuous curve which, for increasing values of DV, first falls rapidly then tends to become horizontal for the higher values of DV. Thus, for the range here recorded, K approaches but does not attain constancy; that is, the resistance tends to, but does not actually, vary as the square of the speed.

For convenience in comparing these results with the like reported from other laboratories the shape coefficient C is given in Plate II in foot pound second units.

The degree of precision of the measurements may be inferred partly from the consistency of the plotted data; partly from the fact that the average speed of the air past the strut can be determined truly to about 1 per cent., and that the finest drag indication of the Eiffel balance is about .002 pound. The precision is sufficient to indicate the merits of this strut as compared with others tested in the same way. The error in finding the pressure-drop resistance is probably negligible, since this force is relatively small. Its ratio to the net resistance, at 40 miles an hour, has the following percentage values respectively for the four struts taken in their order of thickness: 1.06, 2.82, 4.54, 5.70.

Comparison with Other Struts.—In report No. 131 it will be shown from resistance data, obtained in the way here recorded, for an NPL strut 5 feet long and of uniform section 3 by 9 inches, that this shape has, for ordinary sizes and working speeds, 15 to 20 per cent. more resistance than the Navy No. 1 strut of the same over-all dimensions. may be made also to Reports and Memoranda (New Series) 416 of the British Advisory Committee for Aeronautics, which summarizes the resistance coefficients for all the struts tested at the National Physical Laboratory prior to 1918, and those tested by Eiffel before the outbreak of war in 1914. It delineates K in terms of DV for a strut of minimum resistance, in a plot that would cross above the one shown in Plate II at the distance DV=7, and continue well above it for all the higher values.

Remark.—From this investigation it appears that, for the higher values of DV found in present practice, the Navy Strut No. 1 has a smaller coefficient of resistance than any hitherto reported. No account is now taken of the weight and section modulus of the strut, which usually enter the coefficient of merit. The general effect of these is well known and need not be treated here.



# 570 FIRES DISCOVERED BY FOREST FIRE AERIAL **PATROLS**

In co-operation with the Forestry Bureau and to determine the value of aircraft in forest patrol work, the Commanding Officers of March, Mather and Rockwell Fields, and Ross Field Officers of March, Mather and Rockwell Fields, and Ross Field Balloon School were instructed to work out forest patrol routes with the assistance of the District Forester. These patrols were inaugurated on June 1st, and have been very successful in locating fires, reports of fires reaching the District Forester sometimes within fifteen minutes after their origin, Radio equipment was supplied to all fields and a system of

co-ordinates worked out, the observer to check in by radio

co-ordinates worked out, the observer to check in by radio over a designated place, rendering it possible to trace a plane over its entire mission and in case of a forced landing determine the approximate position of the plane.

The following report received from Colonel H. H. Arnold, Department Air Service Officer, Western Department, gives a detailed account of the splendid work performed by the divers Forest Patrols from April 1st to October 31st.

The dry season in the Western Department extends over the period from April 1st to October 31st, practically seven months. During this time the fire hazard in the forest areas is very great and forest fires are numerous.

is very great and forest fires are numerous.

March Field:

The following report covers the operations of the forest patrols at March Field from date of consolidation to October 31, 1919, the date the patrols were withdrawn, a total of one month and twenty-three days:

(e) Total accidents requiring major 

Officer.

About July 24, 1919, telegrams were received by this office from the Governor of Oregon and different Forestry Officials in Oregon requesting aeroplane assistance in locating fires which were raging in Oregon at that time. Authority was requested by this office to send planes to Oregon for forest patrol work and received in telegram from the Director of Air. Service dated July 30, 1919. Lieutenant E. C. Kiel and Sergeant Frank McKee with two aeroplanes were at that time at Camp Lewis, Washington, on recruiting work. These two pilots were ordered by this office to fly to Salem, Oregon, and consult with the Forestry officials at that place with a view of establishing routes for patrols. They arrived at Salem on July 31, 1919, and comemnced operations on August 1, 1919. On their first trip they took with them two Forestry officials. Six fires were located. Their preliminary report to this office showed the necessity of ordering more planes to Oregon. Accordingly Major A. D. Smith was ordered by this office to Mather Field to prepare five JN4D planes and one JN4H plane for forest patrol operations in Oregon. On August 6, 1919, Major A. D. Smith, with five pilots, five mechanics and six aeroplanes flew to Salem, Oregon. They reached Salem on October 7th.

#### SUMMARY OF FOREST PATROL OPERATIONS—SEASON 1919

	Ro.k. 6/1—9/2	March 7 6/1—9/7	March 9/7—10/31	Mather 6/1—9/2	Mather 9/2—10/31	Red Bluff 8/31—10/31	Fresno 8/28—10/31	Oregon 8/1—10/8	Total
	ed 36,854	46,291	22,252	31,128	16,530	29,239	19,709	33,715	235,724 miles
Flying Fires	time410 hr.	466 hr. 56 m.	265 hr. 54 m.	452 h. 56 m.	270 hr.34 m.	340 hr. 39 m.	254 hr. 26 m.	411 hr. 24 m.	2872 hr. 49 m.
discov	vered 24	75	72	85	70	107	9	128	570
Accider involvemajor	ving								
	s 0	3	0	1	0	2	0	2	8
Fataliti		0	.0	0	0	. 0	0	1	1
Aeropla used o	ines daily 2	3	2	2	2	. 2	2	2	17

Major A. D. Smith took charge of the patrols in Oregon on this date. He established one base at Salem and one base This arrangement was continued until at Roseburg. This arrangement was continued until August 26th, when by orders from this office the seven JN4D aeroplanes were replaced by five De Haviland-4 planes, and all operations consolidated at Eugene, Oregon. The operations with the JN4D planes were unsatisfactory because of the limited area which they could cover without landing for gasoline and oil. By changing to De Haviland-4 planes greater

line and oil. By changing to De Haviland-4 planes greater depth was made possible into the mountains, and as a consequence more of the heavily timbered areas are placed under patrol. The cruising radius of the patrols was changed from one hundred miles to three hundred and fifty miles.

The JN4D planes, upon being replaced by De Haviland-4 aeroplanes were ordered by this office to Redding, California, for the purpose of establishing forest patrols out of that point. At the same time it was decided by this office to replace all JN4D planes on forest patrol work with De Haviland-4 planes as soon as they could be assembled and made ready for this work. Accordingly Captain Lowell H. Smith was ordered to Mather Field for the purpose of taking charge of the assembling and testing of De Haviland-4 planes for forest patrol work.

forest patrol work.

The following operations data is given on the Oregon Forest patrols to cover the period from date of its inauguration, August 1, 1919, to October 8, 1919, the date it was discontinued, two months and eight days:

1-Lt. H. W. Webb

(f) Number of tatalities.... I—Lt. H. W. Webb

(g) Average number aeroplanes in daily use..... 2

(h) Type of plane.......JN-4 to Aug. 26th

DH-4 to October 8th

The patrols were discontinued on October 8, 1919, because numerous rains and snows removed the danger of fire.

Redding and Red Bluff, California:

Patrols at Redding, California: were established by this office of August 31, 1919, with the seven IMAD percolanes.

Redding and Red Bluff, California:
Patrols at Redding, California, were established by this office of August 31, 1919, with the seven JN4D aeroplanes which were replaced in Oregon by De Haviland-4 planes. Lieutenant E. C. Kiel was placed in charge of this patrol. Major A. D. Smith was temporarily ordered to Redding to assist in the organization of patrols at that place. On September 6th by orders from this office the seven JN4D planes were replaced with five De Haviland-4 planes and patrols continued with De Haviland-4 planes until October 31st. Lieutenant J. S. Krull relieved Lieutenant E. C. Kiel as Commanding Officer on the same date. On September 15th the patrol base was changed from Redding to Red Bluff. This

change was made after an inspection by the Department Air Service Officer because better facilities for a base existed at Red Bluff than at Redding. A complete report of the operations of this patrol from the date of its inauguration to the date of its discontinuance follows:

(e) Accidents requiring major repair. 2
(f) Number of fatalities.....None 

Fresno, California:

Forest patrol at Fresno was established by this office on August 28, 1919. Two aeroplanes, two pilots and two me-August 28, 1919. Iwo aeropianes, two pilots and two mechanics were the personnel and equipment at first. JN4D aeroplanes were used. Lieutenant Robert Kauch was the senior pilot. On September 14th this detachment was increased to four JN4D aeroplanes, four pilots and six mechanics. Three De Haviland-4 planes replaced the JN4D planes on September 21, 1919. This patrol was discontinued on October 31st. Following operations data covering period of operations is given:

DH-4 to Oct. 31

Summing up the forest patrol operations this season it is Summing up the forest patrol operations this season it is desired particularly to commend the pilots and mechanics on their excellent work. Practically all of the forest areas are over mountainous terrain. The number of available landing places in case of motor trouble are very few. Skillful piloting is necessary to avoid being lost in the smoke and fog which prevails when large fires are burning. The pilots and mechanics have performed this work with a willing spirit and it is by their efforts principally that the successful results obtained during the season were made possible. The meobtained during the season were made possible. The mechanics, as a rule, acted as observers for their pilots. On account of this fact orders were issued placing all mechanics who made such flights on flying status.

That the aeroplane patrol has aided materially in checking the number and extent of forest fires is an unquestioned fact. Forestry officials have expressed themselves as being very

much pleased with the results obtained this year.

#### Association Planned to Boost Air Service

Kansas City.—Tentative organization of a "National Airways Association" was effected in Kansas City Oct. 30, at a convention called by the Associated High-

ways of America.

The following committee to effect a temporary organization and to set the time and place for the convention to or-Bracken, Paris, Texas; O. M. Phelps, Huron, S. D.; H. A. Russell, Fort Scott, Kan.; Frank A. Davis, Kansas City, Mo.; A. Q. Miller, Belleville, Kan.; J. J. Moriarty, Shakopee, Minn.; Wesley Connett, St. Loseph, Mo.

St. Joseph, Mo.

The committee elected Bracken, chairman, Davis, secretary. Bracken is secretary of the Chamber of Commerce at Paris, Tex., and Davis is secretary of the Associated Highways of America.

The purposes of the convention and the new organization is to promote a systematic development of accommodations for air travel-both plane and lighter-thanair' machines.

The delegates reported keen interest in air travel among local business men. The reflection being of sentiment in smaller towns, since large cities—except in the case of Kansas City—were not represented. Local merchants expect that air

travel and shipment of merchandise-especially machine parts—will have a pro-nounced effect on their business by de-veloping landing fields and facilities for supplying and repairing air machines, the communities expect to secure a beneficial effect, and avoid loss of tourist and business travel.

Government representatives present offered co-operation, and gave useful suggestions as to avenues of activity through which the Airways Association could promote mail routes and other air lines. Persons representing manufacturers of air machines, and those planning air routes for passenger and express, were inter-

#### Small Aircraft Flying in England

Just as the era of large automobiles was followed by the creation of small motorcars, so now in the aerial world, there is influx of small aeroplanes. In parks, in the fields, and in various other open spaces miniature aircraft are being tried out in England. One of these small models, called the British Crow, weighs only 220 pounds and flies with almost the speed of a larger model. Another, called the pocket aeroplane, is only sixteen feet long and its inventor, Austin Whipple, says it will achieve a speed of ninety miles

an hour. A feature of this model is that it can be folded for transportation and carried inside a trunk. The French are also working at small models. A monoplane is being turned out by a Garsay firm with a wing span of only thirteen feet. Fitted with a ten horsepower A B C engine it has a speed of sixty two miles per parts. gine it has a speed of sixty-two miles per hour and can land at a low speed also. The average price of these smaller models is from \$1,000 to \$1,200.

#### College Aeronautical Officers Elected City Society

At a meeting of the College of the City of New York Aeronautical Society held on December 18th, the following were

on December 18th, the following were elected officers to serve during this year: President, G. Elliott Morrison; Vice-President, J. M. Hilborn; Treasurer, M. L. Weiner; Recording Secretary, J. R. Tod; Corresponding Secretary, M. Platino.

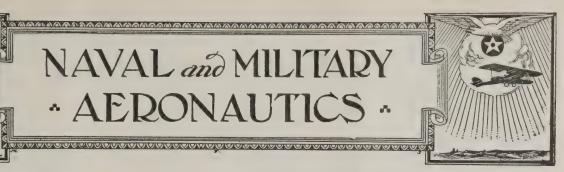
An Executive Committee was also elected consisting of Messrs. Marx and Van Muffling of the faculty and two of the members of the society.

The society will hold some very interesting lectures during the coming season. Anyone interested may apply for membership in the society.

bership in the society.



# NAVAL and MILITARY AERONAUTICS



#### Nine of America's Aces Still With the Air Service

recent statistical report shows that at the present time there are attached to the Air Service nine of America's 68 "Aces," credited with five or more victories. The list of nine follows:

Captain Field E. Kindley, who is a na-

tive of Gravette, Ark., was attached to the 148th Aero Squadron. Captain Kindley worked with the British and is credited with twelve victories. He was decorated with the Distinguished Service Cross with the Oak Leaf, also the Dis-

tinguished Flying Cross.

Captain J. O. Donaldson, Washington,
D. C., who saw service with the R. A. F.,

is credited with eight victories. He was also decorated with the Distinguished Flying Cross (British).

Major Reed M. Chambers, of Memphis, Tenn., who is credited with seven victories, was attached to the 94th Aero Corres, was attached to the 94th Aero Corres, who have decorated with the Squadron, has been decorated with the Distinguished Service Cross and Croix de Guerre.

Captain H. Weir Cook, a native of To-O., was attached to the 94th Aero Squadron. He was decorated with the Distinguished Service Cross with Oak Leaf and has seven victories to his credit.

Captain Martinus E. Stenseth, Twin Valley, Minn., was attached to the 28th Aero Squadron, and is credited with 6 victories.

Captain James A. Healy, who was decorated with the Distinguished Service Cross with Oak Leaf and Croix de Guerre with three Palms, is a native of Jersey City, N. J. Captain Healy was attached to the 147th Aero Squadron and has five victories to his credit. He is at present on duty in the office of the Direc-

tor of Air Service, Washington, D. C. Captain Clayton L. Bissel, a native of Kane, Pennsylvania, was attached to the 148th Aero Squadron. He was decorated with the Distinguished Flying Cross and

has five victories to his credit.

Captain Arthur R. Brooks, of Framingham, Mass., was decorated with the Distinguished Service Cross and has five victories to his credit. He was attached to the 22nd and 139th Aero Squadrons.

1st Lieut. Harold H. George, a native

of Niagara Falls, N. Y., was attached to the 139th Aero Squadron. He was dec-orated with the Distinguished Service Cross, and has five victories to his credit.

#### Senate Committee Urges Pay Increases

Washington, D. C .- A flat increase in pay of 10 per cent, for officers and 20 per cent. for enlisted men of the army, navy and marine corps was voted on December 4 by the Senate Military Affairs Commit-

provisions of the bill if passed would add \$59,000,000 to the payroll of the military and naval establishment.

#### Lieut.-Col. Hartney Receives Italian Decoration

Washington, D. C.—Lieut.-Col. H. E. Hartney, U. S. A., received the Italian Silver Medal for Military Valor. The following citation accompanied the medal: "His Majesty the King by his Decree of February 2, 1918, in accordance with the Royal Decree of March 26, 1833, of His own Nation has awarded the Silver His own Nation, has awarded the Silver Medal for Military Valor to Captain Har-old Evans Hertney (general list and R. F. C. 2nd Army, English Army)."

#### Civilian Personnel Reduced

The War Department authorizes publication of the following from the Office of the Secretary of War:

The civilian personnel of the War De partment in Washington has been reduced over 42 per cent since the signing of the Armistice. At that time there were 37,406 employes of the War Department in Washington, whereas on December 4, 1919, there were 21,584, showing a reduction of 15,822.

In the individual branches, nearly all have reduced their personnel materially, except the office of the Adjutant General which has of necessity been increased somewhat.

The Ordnance Department had on November 11, 1918, about 8,592 employes, and today there are only 1,704, showing a reduction of about 80 per cent.

The Air Service shows a reduction of

about 79 per cent since the Armistice; Secretary's Office 50 per cent; the Chief of Engineers about 85 per cent and the Surgeon General 64 per cent.

#### New Aeroplane Pilots

Under the provisions of Paragraph 1584½, Army Regulations, the following officers having completed the required tests are rated as aeroplane pilots, effective as of dates set after their respective as of dates set after their respective names: Captain Harry T. Wood, Cavalry, October 6, 1919; First Lieut. Edwin E. Aldrin, Coast Artillery Corps, September 6, 1919; Second Lieut. John D. Goodrich, A. S. A., October 10, 1919.

#### To Attend Aeronautics Exposition

Major Melvin A. Hall, of the United States Air Service, who is stationed at London, England, as assistant to the U. S. military attache there, has been officially ordered to Paris for the purpose of attending the Exposition Aeronautique which is being held in that city on December 20. After the exposition he will return to London.

#### Change of Stations

Orders have been requested of the Adjutant General for the following named Adjutant General for the following named field officers to change station as follows since November 29, 1919:—Major George H. Brett, A. S. A., from Aviation General Supply Depot, Morrison, Virginia, to Washington, D. C.; December 3, 1919, Major Arnold N. Krogstad, A. S. A., from Eberts Field, Lonoke, Arkansas, to Aviation General Supply Depot, Morrison, Virginia, to assume command; December 5, 1919, Major Thomas J. Hanley, A. S. A., from Carruthers Field, Benbrook, Texas, to Langley Field, Hampton, Virginia; December 12, 1919, Lieut, Col. brook, Iexas, to Langley Field, Hampton, Virginia; December 12, 1919, Lieut. Col. Henry B. Clagett, A. S. A., from Kelly Field, San Antonio, Texas, to Charleston, S. C., for duty as Department Air Service Officer; Lieut. Colonel Herbert A. Dargue, A. S. A., from Charleston, S. C., to Dayton, Ohio.



Three-quarter view of a Caproni biplane. Note the characteristic two fuselages and three rudders. There are two tractor and one pusher Liberty motor



#### FOREIGN **NEWS**



French-Danish Aerial Flower Delivery Service

Copenhagen.—On November 6 a French aerial transport service of flowers is to be started to Denmark, as a Copenhagen firm has contracted with Breguet to have the Paris-Casablanca pilot, M. Roget, to fly, accompanied by a mechanic, with one intermediate landing in Holland, to the Danish capital in one day. Half a ton of Nizza flowers will be carried for a payment of 12,000 frs., which includes the right of a return load of 200 kg. or two passengers.

It should be possible to sell flowers sent in this way more cheaply than home-grown roses and gilli-flowers. If successful, this aerial flower service will be established as a regular feature.

Bavarian Air Traffic Company Gets Exclusive Rights
Berlin.—According to information from a Bavarian source, there
has been formed a new company known as the Bavarian Air Traffic
Co., Ltd., with a capital of 500,000 marks, by the co-operation of the
following firms: Bavarian Rumpler Works in Augsburg, Bavarian Air
Lloyd, Bavarian Aircraft Works, Bavarian Motor Works and Gotha
Aircraft Works. The new concern will carry out no direct service.
This will be carried out by the above-mentioned companies. The Air
Traffic Co. will limit its activities to organizing development of the
enterprise, to propaganda, daily and technical work, besides co-operation
with other concerns.

The Bavarian Government will not participate directly in the new
enterprise, but has supported it by granting it the exclusive concession
rights for aerial business transport of passengers and mail and for photography work within Bavaria. For this work a "Bavarian Photo Co.,
Ltd.," has been formed chiefly by the co-operation of the photography
in the Army authorities are to sell aeroplanes, aerodromes with weaks

Ltd.," has been formed chiefly by the co-operation of the photographic industry.

The Army authorities are to sell aeroplanes, aerodromes, with works and equipment, to the concern on favorable conditions. The passenger fares have not been fixed so far, but 10 pfennigs (1½ d.) is to be paid for letters beyond the ordinary stamp, and a dispatch fee is to be paid extra if express service is asked for. The price for paper-sending has not been settled yet, but is likely to be fixed at 10 marks (10s.) per kilo.

Over 14,000 Aero Engines Built In Italy During War Period Rome.—The production of aircraft engines in Italy during the war period, 1915-1918, was 14,820. Half of these were produced at the F.I.A.T. works. Four thousand engines were exchanged for other sup-plies from the Allied governments.

The British Aircraft Competitions of 1920

In connection with the British Aircraft Competitions for prizes amounting to £64,000, the Air Ministry announced on November 10 the following list of engines for use by competitors which have been approved by the Air Council. It will be left to the discretion of the judges to decide whether any new engine not included in this list fulfills the conditions of the competition.

A.B.C. (all types), Beardmore (100 h.p.), B.H.P., B.R.1, B.R.2, Cosmos (all types), Galloway Adriatic, Galloway Atlantic, Galloway Pacific, Green (all types), Napier Lion, R.A.F. (all types), Rolls-Royce (all types), Siddeley Puma, Sunbeam (all types), Wosley Viper.

The competition will be held commencing on the following dates:
Aeroplanes (small types), March 1, 1920.
Seaplanes (amphibians), August 1, 1920.
The places at which the competitions will be held will be announced later.

later.

Competitors must enter machines on or before the following dates:
Aeroplanes (small type), December 31, 1919.
Aeroplanes (large type), May 1, 1920.
Seaplanes (amphibians), April 1, 1920.
The following publications in connection with these competitions will be available for issue toward the end of the month:
British Aircraft Competitions 1920, Aeroplanes, Conditions and Tests (B.A.C. Form A).
British Aircraft Competitions 1920, Seaplanes (Amphibians), Conditions and Tests (B.A.C. Form B).
British Aircraft Competitions 1920, Rules and Regulations (B.A.C. ditions and Tests (B.A.C. Form C).



British Aircraft Competitions 1920, Notice to Competitors (B.A.C.

Form C).

British Aircraft Competitions 1920, Entry Forms (B.A.C. Form E).

These papers will be obtainable from H.M. Stationery Office or from the Secretary (C.A.L.) Air Ministry.

Vickers Arranges \$45,000,000 Loan to China
The Vickers Co., British Aeroplane manufacturer, has arranged to loan the Chinese Government \$45,000,000 at 8 per cent to be used to purchase aeroplanes, hangars and parts from that company, according to cable advices.

Paris.—Lieutenant Etiene Poulet, the military aviator, who is flying to Melbourne, Australia, left Karachi, India, for Bombay on November 25. Engine trouble developed, however, and he was forced to descend when only half the proposed journey had been completed.

Spanish Government Purchases 52 British Aeroplanes
Madrid.—Spain is making a serious effort to improve the flying service
and has just placed a contract with a British company for fifty-two
machines of the latest models. Some are to be used in Morocco.
The Government has engaged a number of British pilots to instruct
flying candidates. These are numerous and include the Infanta Alfonso
of Orleans, who, although he has had previous experience in the air,
is taking instructions under the British experts.

Chili to Appropriate for Purchases of Aircraft
Santiago, Chili.—The Parliamentary Budget Committee is including
ands for the purchase of aircraft in its plans to increase the efficiency
the Army and Navy.

British Officer Makes New South American Altitude Record Santiago, Chiki.—Major Huston, of the British Army, attached to the Chilian Army as an aviation instructor, on November 26 broke the altitude record for South America. He ascended 21,400 feet in eighty-five minutes with an experimental scout biplane of 220 horsepower.

The previous South American record was held by Lieutenant Parodi of the Argentine Army. He ascended 21,250 feet at the Palomar military aviation field in Buenos Ayres in March.

Sopwith and Vickers Biplanes Leave for Australia \*\*
London.—The Sopwith "Wallaby" left Hounslow on October 21 for Australia. The machine made a stop at Cologne, from which town a start was made on October 31. No word has been heard from Captain Matthews, who is apparently weatherbound at some isolated point.

The Vickers-Vimy machine, fitted with two 250-horsepower Rolls-Royce "Eagle" engines, left Hounslow on November 4. The pilot was Captain Ross Smith, and he was accompanied by Lieutenant K. M. Smith, Sergt. J. M. Bennett and Sergt. W. H. Shiers.

Michelin Offers 500,000 Francs Helicopter Prize
Paris.—M. Michelin has placed the sum of 500,000 francs at the disposal of the Aero Club of France to be awarded to the first aviator who succeeds in rising vertically from the ground, landing vertically in a radius of five meters and attaining a speed of 200 kilometers per hour.

Anglo-Swiss Air Traffic Agreement
London.—A temporary agreement has been reached between the Swiss
and the British Governments permitting aviators to land in Switzerland
and vice-versa. The most important Swiss aerodrome is at Dubendorf,
near Zurich, on the route to Rome and Southeastern Europe.

Vickers-Vimy Reaches Delhi
London.—Captain Ross Smith, who is attempting a flight from England to Australia, arrived at Delhi, India, November 25, according to advices received here.
Captain Smith, who left the Hounslow Aviation Field, just outside London, on the morning of November 12, arrived in Cairo on November 18, continuing his flight the next day.

Reinsurance for Aircraft Policies in England
London.—In England aircraft insurance has arrived at the reinsurance stage—that is, one office has undertaken to provide reinsurance to companies writing the class.

It is true that organized investigation is being made of aviation insurance problems by the National Automobile Underwriters' Conference, but detailed reports of the results are not yet to be obtained.

It is the Sterling Offices, Ltd., London, that has just arranged for a special aviation insurance department and has appointed Maxwell D. Walker, late captain of the Royal Air Force, to take charge of the technical side of the work.

Lieut. E. P. Graves of Kosciusko Aerial Squadron Killed
Lemberg, Poland.—Lieut. E. P. Graves is the first member of the
Kosciusko Squadron, which consists of American volunteers with the
Polish Army fighting the Bolsheviki, to lose his life. He was participating in the celebration of the freeing of Lemberg from the Ukranians
a year ago on November 22. He had already made several flights over
the enemy lines.

French Commercial Aeronautic Plans Outlined
Paris—General Duval, once commander of all the French military air forces on the western front, and now in charge of organizing a body for French flying which holds authority from the Cabinet, says:
"We intend to connect Paris with the capitals of neighboring states and to build air routes between the districts which have had train services. The railway routes mainly run toward Paris; we, therefore, intend to create air routes across the country. For example, Bordeaux to Nice and Bordeaux to Nancy. This is to give the fliers the greatest chances for commercial profits.
"Next year we expect to have built aerodromes between Boulogne, Paris, Lyons and Nice, thus covering part of the East Indian trade route. Our goal is to link up all parts of our empire by air. For this we are now experimenting as far as Morocco. In time we shall have managed to connect this colony with Senegal, Sahara and Congo."



## ELEMENTARY AERONAUTICS

## MODEL NOTES

By John F. M-Mahon

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#### Motorcycle Engined Aeroplane

(Continued from last week)

THE fuselage should be completed before building the wings or control surfaces. The body details must next be considered, as it would be impossible to install controls after the fuselage is covered. When the seat is in place the control stick assembly can be made. As illustrated in the drawing, it is composed of steel tubing and cold rolled steel. Two bearings are shaped from .090 of an inch cold rolled steel to form a loop with an opening 1" in diameter and two legs about 2" long on each side. These legs are bolted to the floor when the assembly is complete; then a piece of steel tubing 20 gauge 1" outside diameter and 16 inches long is used for the rocker shaft, and two bearings are placed on the tube. An arm made of 3 sheets of .090 sheet steel to the shape shown, having a 1" hole and a ¼" hole, 5 inches between centers is welded to the end of the rocker shaft. When completed, the rear wing struts are attached for warping the wings when control stick is moved. At the forward end another piece of tubing 24" long is attached by splitting and spreading the ends to form a sort of fork, ¼" bolt passed through. This combination allows the control stick to move in any direction. A whole is drilled through the control HE fuselage should be completed before building the in any direction. A whole is drilled through the control stick 5" above the hole in the fork ends to which the elevator flap wires are attached. The wire that runs through the pulley in front and then back is the one that is attached to the upper horn on the elevators. The one that runs back direct from the stick is fastened to the lower elevator horn.

The two spars attached to the rear horn on the rocker arm are used for warping the wings, and later are fastened to the rear wing spars. The rudder is turned by a movement of the foot bar (rudder bar). The wires are attached to each end and run back to corresponding rudder horns. These wires are not crosed like those attached to the elevator horns, but continue in a straight direction. When vator horns, but continue in a straight direction. When turning to the left it is necessary to push the left side forward to the right, then the right side forward or just vice versa, to that which would be correct for steering a bobor kiddie car.

sled or kiddie car.

The foot or rudder bar is made of 34" thick ash 16" long and shaped like a bob-sled bar. A hole ½4" in diameter is drilled for the pivot pin (which is a ½4" S.A.E. bolt). It is necessary to keep this bar at least 4" from the floor for free movement and the writer's suggestions are shown in the cut. Of course these are simple, consisting of the bar held from the floor by a sort of tripod made from sheet steel. More elaborate and better ideas can be doped out by the builder which might be stronger. This one is simple and will be found practical.

When the control stick is moved to the right or left, the rocker shaft moves the rear horn like an inverted pendulum which pushes one wing strut and pulls the other. that is pushed raises up the spar of that side, giving the wing a negative angle of incidence, forcing it down, while the one that is pulled draws the wing spar down, giving that side of the wing a greater positive angle, thereby causing that side to exert a greater lifting force. The combined action of the two causes the machine to turn laterally which is the action necessary in case a sudden gust of wind lifts one

the action necessary in case a sudden gust of wind lifts one side of the aeroplane or it banks on a turn.

By moving the control stick back and forth horizontal stability is maintained. When the stick is pulled toward the pilot, the wire that passes through the pulley is moved and the upper elevator horn moved forward. This causes the elevator to assume a negative angle to the line of flight, depressing the tail and the plane climbs. When the stick is moved forward the action is opposite to that just mentioned. The wheels are 20" in diameter and the tires are 2". The axle is Shelby steel tubing 16 gauge 5 feet long. To keep the axle from moving or shifting to the side a clamp somewhat similar to that of a hose clamp is fastened around the axle and when screwed up tight is bolted to the center spar of the floor board. Of course the axle is centered before the clamp is fastened. The wheels are then assembled on th axle, held on by a washer and a cotter pin passed through holes in the end of the axle.

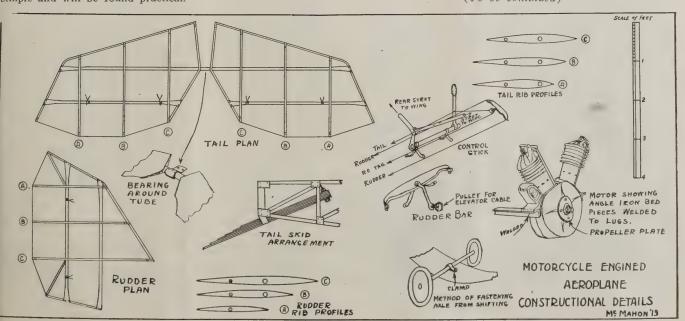
The tail skid is made from 6 strips of 3/16" x 1" ash of

The tail skid is made from 6 strips of 3/16" x 1" ash of different lengths to form a sort of cantilever spring arrangement. An eye bolt is passed through the upper ends and a large washer or plate put on before the nut is screwed up. A strap is fastened around them and attached to the rudder post with a 3/16" bolt. A bessemer steel rod 3/16" in diameter is threaded on the ends and passed through the eye bolt, then through holes drilled in each of the vertical struts just below the top longerons where the metal plates are. The rod is not screwed up tight but allowed to sag in order to form a "V". Another method would be to put the rod through the eyebolt, then twist it into a loop after which it

is passed through the holes in the struts.

The body should be covered with a good grade of unbleached muslin—10 yards 54" wide is needed for the body. The bottom should be covered first, the cloth being held by tacks placed about 6" apart and the sides fastened. The cloth should be pulled taut. After the top is covered in a similar manner, the ends should be sewn together. The body requires at least two coats of dope and one of spar varnish to fill the pores and shrink the fabric, at the same time increasing the strength. time increasing the strength.

(To be continued)





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Ruthless Rhymes

Tommy ate his dinner quick For the soup was extra thick. Mabel's screams were loud and louder, "Mother's gone and boiled my powder."

On my journey back from France, I pancaked on an Avro Dance, You should just have seen them hop! Now I need another prop.

Father had to walk to work, And the milkman stopped away. All the butchers' shops were shut, Mother's hair was turning grey, Suddenly she brightened up, "Now Aunt Jane can't come to stay." -The Joystick.

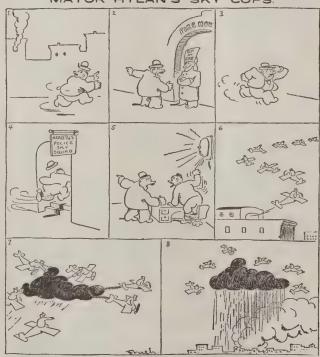
#### Explained

The Judge: "You were found under a bed with a bag of tools. Any excuse?"

The Prisoner: "Force of habit, yer washup! I've been a motorist."—London Opinion.

"That flying parson is some bird-man." "He's no bird-man. Just a plane preacher."—Froth.

#### MAYOR HYLAN'S SKY COPS



Courtesy N. Y. World.

#### Nearer Heaven While It Lasted

A newspaper tells of a New York couple being married in aeroplane. The only advantage was that they got back an aeroplane. to earth more quickly than most newly weds.-Boston Tran-

#### Even the Birds Walked

A naval aviation cadet at Miami, Fla., was assigned to a seaplane with orders to stay in the air for an hour. After a flight of thirty minutes the cadet landed and taxied on to the beach.

The division commander, with fire in his eye, descended upon the luckless student. "What's the matter with you?" he demanded. "I told you to stay out an hour. You've only been gone half that time."

"Really, sir," replied the student, "the air is awful rough. I never saw anything like it. Why, I looked up the road toward Miami, and it was full of birds walking into town."— Everybody's.

#### Technical Knowledge

How is a machine supported in flight?—By flying wires. What is the object of a tail plane?—It is fitted for stabling

What is propeller torque?—When the propeller is loose on its boss, and rattles.

How does a machine get into a glide?—By gravity, acting through the propeller boss.

How is rotary motion obtained in a rotary engine?—By means of two eccentric circles.

What is the construction of a crank-case of a mono?—It is made of cramped iron filings.

What are the chief points of a R.A.F. engine?—It has crinkly cylinders.

How would you find the direction of the wind?—By holding out my handkerchief.

You lose your way over the enemy lines, how would you find your way back?—I would come down and wait for someone to approach. I would then talk to him in English, and if he answered in German I would turn round and fly back in the opposite direction.

What is the right bank of a river?—On your right when you are speaking from the mouth of the river.

What are iso-bars?-Hot air rises from the ground, and where it meets cold air coming from the sky it freezes and forms iso-bars.

What are the chief duties of an Equipment Officer?—He acts as adviser to his C.O., looks after stores, etc., and sees that all rubber articles are wrapped in French chalk.—The Aeroplane.

#### Tough Luck

"Waiter," said a diner in a country restaurant, "this chicken

"Very sorry, sir, but you see that chicken was a peculiar bird. Why, when we came to kill it, we couldn't catch it. It flew up on the top of the barn and we had to shoot it."

"Are you sure you didn't shoot the weathercock by mistake?"—The Joystick.



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SERVICE-PERFORMANCE

416

# AVIS! THE DEMAND FOR "BELLANCAS"

which occupies the entire time and attention of the personnel of our Aircraft Department engaged in manufacture and distribution, necessitates our regretfully foregoing representation at the Chicago Aero Show, which, together with every other factor advancing the good cause of American Aeronautics, has our sincere wishes for success.

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This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to Aerial Routes in the United States furnished on application.)

## Now is the Time to Place Your Christmas Orders for Flying Model Aeroplanes, Aeronautic Books, Aeronautic Jewelry, Aviation Novelties, etc.

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Books treating of the several phases of aeronautics, such as: construction, operation and design of aeroplanes, all types, both domestic and foreign—other volumes treating of aerodynamics, meteorology, and a most complete collection on model aeroplanes, wireless, etc. For those who are particularly interested in the wonderful work of the several aces and aviators who have experienced the most thrilling exploits, we can supply any number of excellent, popular, and up-to-date volumes on the subject.

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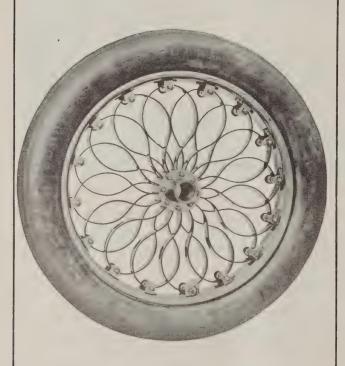
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## JAMES LEVY AIRCRAFT

2033-35-37-39 Indiana Ave. **CHICAGO** 

(Continued from page 406) cotton cloth on aeroplane wings has come from the claim of insufficient tautness. This has often been well grounded. The cause was very often insufficient cloth tautness before doping.

cause was very often insufficient cloth tautness before doping. There has been much controversy over the actual effect of acetate dope re the tightening of cotton wing covers. The matter has not by any means been cleared up. It is probably true that the first coat of acetate dope on cotton actually slightly loosens the cover—it has been suggested due to yarn slippage. It has been proved by experience that a cotton cover initially slack will not be tightened so much by acetate dope as a linen cover similarly treated. Cotton covers then should be drawn as tightly as possible before doping. When this is done, it may be confidently asserted, no trouble with the tautness of the finished wing cover of cotton and acetate dope will be experienced, provided proper dope application methods will be experienced, provided proper dope application methods and proper dope and pigmented coverings are used. No evidence has as yet been brought to light that there is danger of too much tautness being given the cloth before doping. Depending entirely on the dope for tight wings, as has been the case in many instances in the past, is not good engineering.

In production—large production—the envelope method will be found to give far more uniform tautness in a shorter opera-tion time and with less care, save at the cutting table, than the other method of application. This is the experience of the other method of application. This is the experience of some of the largest plants working on Government aeroplane contracts during the war. The personal equation of the worker enters, with the envelope method, very little save at the cutting table. The lateral pulling of the wing cover before attachment at the fuselage side of the wing is simple and not subject to the variations likely to occur when sewing along the whole length of the trailing edge.

Application of Reinforcing Tape

After the cover is applied and sewn, reinforcing tape, described previously, is stretched on the fabric over the ribs. The reinforcing tape should be tacked in place, brought around the leading edge at moderate tension and tacked again at the other side of the wing. The tape must lie flat, enough tension being applied to obviate the possibility of the tape's bulging as the cover is sawn. On wide how ribs two approximations are necessarily as the cover is sawn. bulging as the cover is sewn. On wide box ribs two or more lengths of tape side by side should be used.

(To be concluded)



l. 10, No. 12

**JANUARY 5, 1920** 

10 CENTS A COPY



Winter Has Few Obstacles for Present Day Aerial Transportation

United States Has Opportunity to Lead World in Civilian Aeronautic Activities and as a Market for Aircraft in 1920



The Brewster-Goldsmith Corporation
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Published Weekly by THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., January 5, 1920 Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, JANUARY 5, 1920.

NO. 12

## OVER \$2,000,000 IN PRIZES FOR 1920

AIRMEN will have over \$2,000,000 in prizes to compete for in 1920, in competitions being organized by the national Aero Clubs of different countries under the rules of the International Aeronautic Federation, of which the Aero Club of America is the sole representative in the United States.

Among these principal contests for which the Aero Club of America is to select competitors to represent the United

States are:

(1) The International Aviation Trophy Contest, to be held in France, for which the national Aero Club of each of the countries represented in the Federation can enter three rep-

resentatives;
(2) The International Marine Flying Trophy, to be held in Italy, for which the national Aero Club of each of the countries represented in the Federation can have three rep-

resentatives

resentatives;
(3) The First Aerial Derby Around the World, the rules and regulations for which are being considered by the Federation at date of writing and for which \$1,000,000 in prizes are being raised;

(4) The International Balloon Trophy Contest, to be held in the United States, for which the national Aero Club of each of the countries represented in the Federation can enter

three representatives;

(5) The International Aerial Derby across the United States, with \$100,000 in prizes, being organized by the Aerial League of America, which will be open to all the national

Aero Clubs and organizations affiliated with the Aero Club

of America and Aerial League of America;

(6) The Cuban Aerial Contests, being held under the auspices of the Aerial League of Cuba during the Third Pan-American Aeronautic Congress at Havana, February 21 to March 1, 1920;

(7) The \$50,000 prize offered by Mr. Thomas H. Ince through the Pacific Aero Club and Aero Club of America for a flight across the Pacific;

(8) The \$25,000 prize offered through the Aero Club of

(8) The \$25,000 prize offered through the Aero Club of America by Mr. Raymond Orteig for the first flight from

New York to Paris or vice versa;

(9) The Intercollegiate Trophies and \$5,000 Valentine prizes being organized by the Aerial League of America;

(10) The Curtiss Marine Flying Contest for \$1,000 cash prize, open to members of the Aero Club of America and its affiliated clubs

affinated clubs;
(11) The \$2,000 Glidden Trophy Aerial Touring Contest being organized by the Aerial Touring Association, of which Major Charles J. Glidden, the originator of the famous Glidden tours, is president.

A number of other contests with large cash prizes are

being organized, the details of which will be announced in the

Persons desiring to enter in these contests must secure an international pilot certificate which is issued in the United States by the Aero Club of America, 297 Madison Avenue, New York City.

## UNITED STATES HAS OPPORTUNITY TO LEAD WORLD IN CIVILIAN AERONAUTIC ACTIVITIES AND AS A MARKET FOR AIRCRFT IN 1920

Report of Commission of Aero Club of America and Aerial League of America Which Investigated Aircraft Demand and Aeronautic Possibilities in United States, Europe and South and Central America.

THAT the United States has opportunity to lead the world in civilian aeronautic activities and as a market for aircraft in 1920 is the conclusion reached by the officals of the Aero Club of America and the Aerial League of America after studying the reports of the commissions which investigated the demand for aircraft and possibilities for the employment of aircraft for utilitarian purposes in the United States, Europe, South and Central America and Japan and China and China.

The investigations were most thorough and painstaking, and made by four separate commissions. One, headed by Alan R. Hawley, traveled through the United States; another headed by Commodore Louis D. Beaumont and Major Charles J. Glidden proceeded to Japan and China; another headed by Augustus Post traveled through Europe, studying conditions in England, France, Italy, Sweden, Spain, Portugal and Switzerland, and the fourth, of which Alberto Santos Dumont is chairman, has been studying the field in South and Central America for the past two years.

With the return of Mr. Augustus Post, secretary of the club, who was part of the commission which studied aero-nautic activities in Europe, it was possible to combine his report with the reports of the other commissions and draw definite conclusions as to the status of aeronautics throughout the world.

#### Where U. S. is Ahead

The report issued jointly by the Aero Club of America, of which Colonel Jefferson de Mont Thompson is president, and the Aerial League of America, of which Read Admiral Robert E. Peary is president, reads in part:

"We are on the threshold of the age of aerial transporta-

tion and of general use of aircraft and the only possible obstacle is the possibility that aircraft manufacturers may fail to prepare to meet the large demand for aircraft for civilian purposes during the coming year, as they did during

"A close survey of aeronautics all over the world shows that, briefly, the United States is today far ahead of all other countries in:

"(1) Number of planes actually bought, ordered and in

use for civilian purposes;

"(2) Number of aerial transportation lines being organized;

"(3) Actual daily performance of the Aerial Mail Service and volume of mail carried;

"(4) Possibility for the use of aircraft for commercial purposes and civil uses due to great size of the country and the fact that in part of the country it is possible to fly to the fact that in part of the country it is possible to fly

through the winter;

"(5) The United States Post Office has proven by turning unused military aeroplanes into efficient aerial mail planes that the thousands of military planes which are stored away and the thousands of motors, as well as the fifteen hundred surplus navy seaplanes and hundreds of millions of dollars of Army and Navy aircraft materials, accessories and instruments can be utilized to meet the immediate demand for aircraft which manufacturers are unable to meet.

"But the field for the employment of aircraft is so vast and the demand for aircraft for pleasure and sport is so great that it will absorb all the surplus military and naval planes and whatever the present aeronautic manufacturing facilities

of different countries can produce.

"The demand for large passenger carrying aircraft alone would keep all the present manufacturers busy for the entire coming year. These aircraft are so large that constructing coming year. These aircraft are so large that constructing them is almost like constructing ships of the sea. Constructing two hundred of the large aircraft would keep the American and British aircraft manufacturers busy for a year, and yet two hundred would not be many to meet the demand for sixtings the world over airlines the world over.

## Aeronautic Industries All Over the World Dependent on Civilian Business

"Following the United States' example, England, France and Italy have abandoned their programs for huge air fleets and have demobilized their military and naval air services

down to a minimum.

"The aircraft industries of those countries were forced, by lack of military and naval business, to turn to commercial aeronautics and to develop aircraft suitable for general use. They did so and found as American aircraft manufacturers have found in the United States, that the demand for aircraft for civilian purposes is so enormous that they will not be able to supply more than a fraction of the demand during

the coming six months.
"European aircraft manufacturers were more progressive European aircraft manufacturers were more progressive than American manufacturers and immediately the armistice was signed began to establish aerial transportation and passenger carrying lines. Our commission in Europe has traveled on these air lines and has found them so efficiently run and reliable that many people travel by air rather than travel by rather than travel by

railroad or by steamer.

"But European manufacturers were not as fortunate as American manufacturers, who had such an extensive market right in the United States and in South and Central America.

#### Aeronautic Movement Given Up as "Dead" a Year Ago

A year ago, at the end of the New York Aero Show, the aeronautic movement was given up as dead by most people.

Those of us who expressed belief that hundreds of people would buy aeroplanes for pleasure, sport, passenger carrying, travel and transportation were called visionary. The only planes flying at the time were Army and Navy planes and civilian flying was still under ban. The Army and Navy contracts had been stopped and hundreds of Army and Navy contracts had been stopped and hundreds of Army and Navy aviators were leaving the service and frankly stated that they were "fed up" on piloting a plane and would not look at another plane in their lifetime.

Manufacturers were dejected and contributed to make the situation were about their electrons and contributed to make the

Manufacturers were dejected and contributed to make the situation worse by their gloomy statements, which were in effect that the aeronautic infant had died and the burial ceremony had been held, and it was silly to think of bringing the infant back to life. A new birth was necessary, they stated, and it would take years to cause this new birth!

#### Atlantic City Congress and Contests Started Civilian Flying

The Second Pan-American Aeronautic Congress and contests started civilian activities by bringing to public attention daily for thirty-two days the great possibilities for the employment of aircraft for civilian purposes, doing so early in the year, before people had decided on their summer activities. Thousands of columns of publicity were given by newspapers in the United States, South and Central America and Europe to this great educational event, which was attended by the representative of thirty two countries. attended by the representatives of thirty-two countries.

#### \$100,000 in Prizes Unwon Because Planes Were Unobtainable

The first planes bought by civilians were bought by aviators and sportsmen to participate in the Atlantic City contests. But planes were literally unobtainable and a score of sportsmen and aviators lost months trying to get planes to compete for the various contests organized under the auspices of the Aero Club of America and the Aerial League of America for which a total of over \$100,000 in prizes were offered.

Many of these events were postponed until such time as planes could be secured and are to be held in 1920.

#### Two Thousand Planes Bought for Pleasure, Sport and Transportation

Few people could have foreseen or believed eight months ago that over 2,000 people in the United States alone would purchase aeroplanes ranging in prices from \$3,500 to \$25,000 each, to use for sport, pleasure and transportation. But such is the case and the canvass taken among the 10,000 members of the Aero Club of America and the Aerial League of America and in the cities visited recently by the Special Commission of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well that the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be a special control of the Club and the I easy to be well as the special control of the Club and the I easy to be well as the special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the Club and the I easy to be a special control of the I easy to be a special control of the I easy to b Commission of the Club and the League shows that we may expect by next Spring that thousands of people will order

planes to use for pleasure, sport and transportation.

Delivery of planes only began late in the Summer. By that time several thousand people were waiting patiently and impatiently for them, and most of them are still waiting. Deliveries have been far too slow and the aeronautic movement has suffered because manufacturers have been unable

to meet the demand.

#### Large Orders for Aircraft for South and Central America Some Lost by American Aircraft Industry

American aircraft manufacturers also lost large orders from tatin-American republics. Buyers from those countries came to the United States, but were unable to get promise for deliveries within a reasonable length of time. In a number of cases they went to Europe to buy. This was the case of Mr. Hannibal J. de Mesa, the wealthy sportsman, who finally bought four sixteen passenger and four three passenger Farmer planes in France. man planes in France.

In most cases the buyers postponed placing orders until they see the exhibits at the Aero Show to be held at Hayana they see the exhibits at the Aero Show to be need at Havana during the Third Pan-American Aeronautic Congress, February 21 to March 1, 1920. An invitation was extended several months ago by the Cuban authorities to the Latin-American governments to send commissions to Havana for this

Congress, which were promptly accepted.

#### Curtiss Mission Finds Good Market in South America

C. W. Webster, the head of the Curtiss mission which went to South America only three months ago, reports that he has met with marked success. This market is enormous. The demand for civilians in Latin-American countries is even larger than the demand from governments. They need aircraft there to solve difficult problems of transportation created by the shortage of railways and lack of good roads. It costs an average of \$200,000 per mile and takes years to build railroads. Airlines can be established immediately at comparatively low cost.

#### Small Fortunes Made in Passenger Carrying and Sale of Aeroplanes

Small fortunes have been made during the past six months in passenger carrying and from the sale of used military

training planes.

Several pilots who operated from one to three planes for passenger carrying in different parts of the country made small fortunes carrying passengers at from \$15 to \$25 a flight. Two pilots who started out with a single old aeroplane soon were able to buy two more planes and took in over \$140,000 in passenger carrying fees and are now planning extensive passenger carrying services with latest type of planes. About fifty other aviators have had the same pleasant experience.

Some aviators found substantial support in small communities throughout the United States sufficient demand for

passenger carrying flights, photographing of real estate and other civic work and occasional transportation of packages and express matter and cross-country flights. The patronage was sufficient to more than support one or two planes.

The commission of the Aero Club of America and the Aerial League of America which investigated the aeronautic interest in forty-nine cities found that large communities supported as many as half dozen separate aerial passenger carrying organizations.

The Curtiss-Johnson Airplane Company of Montgomery, Ala., distributors of Curtiss aeroplanes and flying boats for the State of Alabama, have purchased seventy-eight Curtiss JN-4D planes from the Curtiss Company for sale to private purchasers.

James Levy, a Chicago automobile agent, undertook to sell aeroplanes a few months ago while waiting for deliveries of automobiles, and sold 150 planes and could actually have sold more if he had been able to get delivery on same.

A small fortune in selling imported aeroplanes has been made by a group of British and American aces who formed a corporation a few months ago called the Interallied Aircraft Corporation, with offices at 185 Madison Avenue.

The officers of this corporation include Colonel William A. Bishop, the famous ace of aces, who had seventy-two enemy planes to his credit, president of the corporation; Lieutenant Colonel Wm. G. Barker, who brought down sixty-eighth enemy planes, who is first vice-president; Major Reed G. Landis, second ranking American ace, who is second vice-president; Lieutenant Charles H. Payne, U. S. N., manager; Captain W. R. Lott, secretary; Ensign J. W. M. Richardson, U. S. N., treasurer, and Lieutenant Stuart McDonald, U. S. A., assistant manager.

These aces formed this corporation several months ago when they found that American manufacturers could not supply the increasing demand for aeroplanes. They arranged to import to the United States aeroplanes of famous makes like the "Sopwith" and "Avro" machines. They readily obtained the financial backing necessary from New York bankers to purchase 2,000 British machines, and Colonel Bishop went to Europe to arrange the purchase and to supervise the shipping, while the other members of the firm attended to the selling end. Within a month after the formation of the company they had received prospective orders for close to 500 aeroplanes, and as the shipping strikes in England prevented the shipping of machines to the United States, they bought fifty second-hand training machines from the Canadian government, which the company sold to waiting customers.

The shipping conditions having improved during the past month, deliveries will soon begin.

Horace Keane, vice-president of the Aircraft Engineering Corporation, advises that they received over 3,500 inquiries from prospective customers who wanted to order "Ace" type planes. Unfortunately experiments and tests delayed production.

The same was true in the case of the Bellanca plane, being constructed by the Maryland Pressed Steel Company and the Martin "Blue Bird," being constructed by Captain James V. Martin. They had thousands of prospective customers who fairly pestered them for deliveries, but were delayed in quantity production by experimental work of developing the efficient low powered and economic motors needed for the light touring planes which these firms are producing and for which there is a large demand.

Another pioneer aeronaut who has already made a small fortune in selling aeroplanes is Captain Horace B. Wild, who has been active in aeronautics since 1906, and built and operated some of the earliest dirigibles and aeroplanes flown in the United States. A few months ago Captain Wild advertised that he had several second-hand aeroplanes for sale. In response to his advertisement he was flooded with prospective orders and he decided to organize a corporation at Lincoln, Neb., and bought a lot of 200 second-hand training planes from the Army and spare parts and Hispano-Suiza motors. Most of these machines were sold before he could actually get deliveries from the Army, and he and his associates netted a small fortune from their enterprise.

These reports of extensive sales of aeroplanes were not included in the report made to the Aero Club of America and the Aerial League of America by the commission which investigated the business prospect for the aeronautic industry in forty-nine cities and which pointed out in its recent report that the aeronautic industry lost \$50,000,000 in orders during the past year because aircraft manufacturers were not in position to make deliveries.

## 10,000 Planes Needed for Passenger Carrying in 10,000 Communities

There are close to fifteen thousand communities, large and small, in the United States and it is safe to say that two-thirds of these can support one or more planes. If we take the conservative estimate of one plane per community we see where ten thousand planes can be placed as soon as they are available.

#### Making Air Lines Public Utilities

To Mr. Alfred W. Lawson, creator and manufacturer of the twenty-passenger Lawson Aerial Pullman, goes the distinction of creating the demand for air lines as public utilities. He flew his remarkable air liner from Milwaukee, where it was built, to large cities, including Chicago, Toledo, Cleveland, Buffalo, Syracuse, New York Washington and Dayton and created in those cities a desire to have such air liners to connect aerially with other cities. Business people all over the country realized from seeing this twenty-passenger aerial Pullman car and from its splendid record that aerial transportation can now be had with comfort and safety and a number of cities are now bidding to secure the distinction of having the first permanent aerial Pullman service and are considering air lines as public utilities. The Lawson Airplane Company has acquired a new factory and is preparing to manufacture twenty "ships" of the twenty-passenger type and as many "sleepers" for night aerial transportation.

#### Over Fifty Aerial Transportation Lines Being Established

Those who are close to aeronautic developments know that over fifty substantial aerial transportation lines are being established and as many more are being contemplated.

Inability to secure large planes for this purpose has been the main obstacle in the way of many of these projects during the past six months.

#### Over Five Hundred Prospective Entries for Aerial Tours

Earl L. Ovington director of the Atlantic City Airport, has reported to Major Charles J. Glidden, president of the Aerial Touring Association, that he has received over five hundred inquiries from people who want to enter the aerial tours to be run weekly by the Aerial Touring Association.

Some of the prospective aerial tourists have only military training planes and want to get special touring planes, but most of the inquiries are from ex-Army and Navy aviators and people who have not been able to get planes and are willing to buy any type they can get delivery on, so as not to miss getting in the aerial tours during the summer vacations.

Some of these people were anxious to participate in the aerial tours planned last Fall, which had to be postponed on account of lack of planes.

Mr. Ovington, who has been in aviation ten years, rightly points out that the prospects for civilian aeronautic activities during 1920 are "immense."

#### British Airship Transportation Lines to the United States

SIMULTANEOUSLY with the announcement that the British Government has, for economic reasons, stopped the construction of large dirigibles, and has cut down her aircraft program to less than the United States program, come despatches announcing that British airship transportation lines are to be established from England to the United States.

This despatch confirms the forecast made by the Aero Club and Aerial League of America authorities when they received the reportt, stating that Great Britain had, for economic reasons given up her plan to construct large dirigibles and has discontinued work on all dirigibles under construction excepting the R-38, which has been bought by the U. S. Navy.

discontinued work on all dirigibles under construction excepting the R-38, which has been bought by the U. S. Navy.

The report read in part as follows:

"England, following the example of the United States, France and Italy and for economic reasons has cut down her air programme considerably to a minimum and has discontinued construction on all dirigibles excepting the R. 38, which has been bought by the United States Navy. The firm, Armstrong & Whitworth, which was building the R. 36, and Short Brothers, who were building the R. 37, were ordered

to stop work.
"The British Government has also abandoned the project to build the giant dirigible of ten million cubic feet hydrogen cubacity."

"Over two hundred and fifty British military aviation fields have been turned back to cultivation during the past six months to cut down expenditures to a minimum and because,

(Continued on page 470)



## THE NEWS OF THE WEEK



#### Aerial Police Proposed in Newark

Newark.—Mayor Gillen thinks it would be simple enough to enforce the ordinance forbidding aviators to fly at less than 4,000 feet above Newark.

"We would have air patrolmen," said the Mayor, "who could watch for vio-lators, take their numbers and have them summoned to answer charges in the police court as now is done with motorists. Of course we could not hand the law-breaker a summons. We would have to

Mayor Gillen said that landing fields around Newark would be plainly marked and lighted by flares at night, so aviators could not offer the excuse of being lost if found hovering 3,999 feet above

the city.

#### Air Mail Service Finds Cheaper Fuel

A fuel more economical than gasoline and less hard on the motor has been tested successfully in the air mail service, according to an announcement made yesterday by Otto Praeger, Second Assistant Postmaster-General in charge of the air mail.

The tests, which were made on the Washington-New York route between August 4 and September 19, indicate a saving of 3.3 gallons of fuel in favor of the new synthetic fuel. It is known commercially as alcogas and is composed of thirty-eight parts of alcohol, nineteen parts to have a few parts to the same and the same benzol, four parts toluol, thirty parts gaso-line and seven and one-half parts ether. The remaining one and one-half part is

not explained.

Mail plane No. 35, a Curtiss machine equipped with a high compression motor, was the machine on which the new fuel was tested. A check plane of similar model flew the opposite way during most of the trips made, using high test aviation gasoline. The alcogas ship made thirty-one flights and the gasoline ship nineteen. Liberty twelve motors were used on both planes, but the alcogas ship was high compression style and the other low.

A saving in lubricating oil also was indicated by the tests. The average for the new fuel was 4.4 quarts an hour as against 4.98 quarts an hour with gasoline. The oil saving is thought to be due to greater thermal efficiency displayed by alcohol fuel as against gasoline. After 125 hours in the air the motor on the alcogas machine was torn down and found to be in fine condition, with less carbon deposited than in the motor using gasoline. At 1,475 revolutions a minute twenty-four gallons of gasoline were consumed an hour, while at the same speed but 20.1 gallons of alcogas were consumed.

#### Italian Aviators Prepare for the Rome-Tokyo Flight

Tokyo.—Lieutenant Gentille, pilot aviator of the Italian army, who has arrived in Tokyo to make preparations for the Rome-Tokyo flight, says the Italian aviators will make short stops at Brindisi, Saloniki, Adalia, Aleppo, Bagdad, Basra, Karachi, Delhi, Calcutta, Rangoon, Bangkok Amoy, Canton, Foochow, Shanghai. kok, Amoy, Canton, Foochow, Shanghai, Tsingtao, Peking, Wiju, Seoul, Fusan and

Osaka.

The journey is expected to occupy fourteen days on account of the numerous



Lieut. Paul R. Moore, R. A. F., an American who was with the Royal Air Force and who has been appointed the first Aerial Customs officer

stops the aviators will make en route. At each halting place an officer and two soldiers of the Italian Aviation Service have been stationed to make preparations for supplying the machines with gasoline and to effect repairs.

#### Flyer Poulet to Continue His Flight to Australia

Paris.-Lieutenant Etienne Poulet, the French aviator, has not abandoned his flight to Australia, according to the *Intransigeant*, which has taken special interest in the aviator, but intends to continue and return to Paris by air. Poulet in a dispatch says that his machine was worn out by the 14,000 kilometers he had already



Reproduction of the badge presented to Earl L. Ovington, as the first Aerial Inspector of the State Board of Commerce and Navigation of New Jersey

covered. A new machine will be sent to Poulet from Marseilles Sunday and should reach Burma, where he now is, in about three weeks.

#### Farman Machines for Colombia

Monsieurs Jourdanet and Bazin, well-known French pilots, arrived in New York from France December 19 and left for Colombia December 23, accompanied by several mechanicians, to start a new

aerial line in Colombia.

The Colombian Company, known as the The Colombian Company, known as the Compania Colombiana de Navegacion Aerea de Medellin, is capitalized for four million francs. According to Mr. W. Wallace Kellett, American representative of H. & M. Farman Co., they have already purchased a Goliath and several smaller Farman planes, which are now en route to Colombia. The Goliath will be used to capital transportation service between Baranguilla and Medellin, a distance of Baranquilla and Medellin, a distance of about 700 kilos.

Medellin is the second city of Colombia in size and the mining and industrial center of the country. At present there are practically no roads between the two cities. The country is mountainous, and means of communication are lacking. This distance now covered in a week, will be made by the aeroplanes in a few hours. Landing fields will be placed every fifty miles along the route. Passengers and merchandise will be carried.

The Colombian Company expects later to creates other aerial lines, in particular one between Medellin and Bogota, the capital of Colombia.

#### Aeroplanes Replacing Cowboys on Ranches

Pensacola.—Two Texan cowboys coming in from the West arrived in Pensacola. They had to wait two hours for their train here and were planning how to pass the time away. A newspaper man, attracted by their strange garb, ventured the sug-gestion they make a trip to the naval air station and see the seaplanes take off over

the bay.

"Airships be —," one replied. "We don't want to see any more of those blankety-blank things. That's why we are here in this God-forsaken country now, to get back to Georgia. The big ranch owners have got those cussed tricks on the ranch, and one man can find more stray cattle in ten minutes in one of them than me and my pard can find riding a pinto in three days. No aeroplanes for us."

#### Around-World Flight Proposal of Airman

San Francisco.-G. M. Gorden, an aviator of Portland, Ore., has announced that he proposed to start from San Francisco before February in an attempt to fly around the world in a seaplane. Honolulu would be his first stop, he said, and his route from there would be via Japan, Hongkong, Singapore, Colombo, Bombay, Aden and Port Said, and across the Mediterranean to Lisbon. He plans to cross the Atlantic via the Azores to New York. From there he expects to fly to Central America and return home by way of San Diego.

## Flying Club and Competitors in New-York-Toronto Race Disqualified

The United States has been informed by the International Aeronautic Federa-tion that the American Flying Club and the competitors in the New York-Toronto race have been disqualified for disregarding the regulations of the F. A. I., which require that races shall be sanctioned by the governing club which represents the Federation in each country.

Neither the Aero Club of America,

which represents the Federation in the United States, nor the Aero Club of Canada, which represents the Royal Aero Club of Great Britain in Canada, had

sanctioned this race.

The duration period of disqualification is left to the discretion of the Aero Club of America. Disqualification interdicts participation in aeronautic events organized anywhere in the world under the rules of the Federation and records made by disqualified parties will not be recognized.

#### Five Spanish Aero Schools

Madrid, Dec. 24.—The government will open five new schools of military aviation January 1. One hundred and thirty student fliers will be enrolled, of whom 20 per cent will be noncommissioned officers and privates.

#### Ross Smith Gets Knighthood

London, Dec. 23.-Knighthood in the order of the British Empire has been conferred by King George upon Capt. Ross Smith, the first aviator to complete an aeroplane flight from England to Australia. Capt. Smith's brother, McPherson Smith, who was the observer in the recent successful flight, was accorded the same honor.

#### To Arrange Pacific Air Race

Peking.—Representatives of the Aero Club of America who are making arrangements for the first aerial derby around the world arrived in Peking on Dec. 17 from Japan. The party included Louis D. Beaumont, Major Charles J. Glidden and Benjamin Hillman.

#### Rigan Porto Rico's First Licensed Pilot

New York, N. Y.—Signor Felix R. Rigan, the first Porto Rican to receive a pilot's license, will carry a letter of felicitation from the Aero Club of America to Mr. Yoger, governor of Porto Rico. Signor Rigan will, in delivering this message at the governor's palace, make his initial flight on the island.

Signor Rigan has had considerable flying experience. He was trained under the instruction of Bruce Eytinge, now advertising manager for the Aircraft Engineering Corporation. During the war Rigan served an enlistment in the navy and was attending the Anapolis ground school at the time of signing the Armistice. Mr. Rigan has purchased a Canadian biplane.

#### Cincinnati Aircraft Co. to Open Field

The operating department of the Cincinnati Aircraft Company will open a new flying field in the near future, probably some time before the first of next March. It will be situated at the Duck Creek Road and Deerfield Pike, Cincinnati. Major R. W. Schroeder, chief test pilot at Mc-Cook Field, Dayton, has been detailed by the Government to lay out the field. It will be a cross field twenty-nine hundred feet north and south and twenty-six hundred and eighty feet east and west. In addition to this nineteen acres have been taken over for the erection of hangars, grandstand and aeronautical school. There will also be a reservation of five acres for private hangars. The field will be reached by taxis and a car-line from Cincinnati.

Mr. E. C. Lay, the president of the company, has taken a special personal interest in the new field, and it is largely due to his efforts that the field, aside from the erection of buildings, has been practically

completed inside of sixty days.

The field has been so placed that commercial industries, mail, school and other activities will be entirely separate, and in no way conflict with each other.

#### German Air Firms Seek Foreign Trade

Geneva.—German aviation firms, according to a despatch from Constance, Germany, have formed a trust to prevent interior competition and to fight for for-

eign trade.

The plan of the combination as outlined in the advices provide for quantity production of aeroplanes and hydro-aeroplanes at a factory either in Munich or Friedrichshafen and at many branches throughout the country. It is stated the project includes the Krupps Bank among its backers.

#### Navy Balloon Lands in Connecticut Tree

Milford, Conn.—Ensigns Kloor, Blackwell and Fleitner, who ascended for a test flight of a balloon from the naval aviation station at Rockaway, L. I., landed in a tall evergreen tree here.

The tree on which the balloon descended was on the farm of Charles Rogers. Several hundred employees of the Askam Rubber Company followed the balloon for a mile as it drifted low with the Ensigns trying to find a lodging place for the anchor. The rubber workers for the anchor. The rubb helped to salvage the balloon.

The Ensigns got warm and had dinner at the Rogers farmhouse and started for Rockaway with the balloon.

#### DIAGONAL AXIS CONTROL AEROPLANE

THE Stacy Airplane Company of Dayton, Ohio, have just completed flight tests of a new type of aeroplane illustrated herewith.

The system of control is described as diagonal axis control as the control planes slightly rotate on a diagonal axis

as compared to the movement of the control planes or surfaces for ordinary type of machine. The movement is controlled by means of a stick before the pilot connected with lever arms and therefore avoiding the use of pulleys or moving wires. These control planes rest in ball

bearings thereby eliminating friction and securing ease of control.

The tests have shown the machine to be very stable and in the design particular attention has been given to the interchangeability of parts.





#### Carwen-Lippincott Combine

The business of the Carlson-Wenstrom Company and the Carwen Steel Tool Company, Erie Avenue and Richmond Street, Philadelphia, will be continued by A. H. & F. H. Lippincott, manufacturers of Screw Machine Products, who have purchased the assets of these two companies and under their direct conversions. panies and under their direct supervision will manufacture the Carwen Dynamic Balancing Machine and all classes of Special Machinery in conjunction with their Screw Machine Products.

Mr. Joseph A. Ganster, M.E., will be associated with the Corporation as Director and Works Manager and Mr. Jacob Lundgren, M.E., as engineer. The business will be conducted under the corporate name of Lippincott-Carwen Corporate

ORATION.

#### Free Ballooning

The publicity department of the Goodyear Tire and Rubber Co. of Akron, O., has put out a small brochure with the above name, which is, apart from being a record of what the Aeronautic department of Goodyear did during the war, a very well timed plea for the furtherance of Aeronautics. So far as balloons are of Aeronautics. So far as balloons are concerned the City of Akron turned out the very great majority of the balloons used by the American Forces in this country and France. The three large rubber companies—Goodyear, Godrich, and Firestone—were responsible for this. Of the three, the Goodyear Company in all probability turned out the greatest number of balloons, whether sphericals, observation or dirigibles. The book is observation or dirigibles. The book is dedicated to the Aero Clubs and Aeronauts of America on whom rests, to a great extent, the responsibility of familiarizing the public with the advantages to be gained by aerial transportation, so that

the public will adopt it on a national and international scale.

Besides a section devoted to the invention and early history of free ballooning, there is one giving the history of American ballooning and American free balloon records. There is also a very interesting resume of the International or Gordon Bennett races from the time of their inception to 1913, the last year the Gordon Bennett was flown.

A word as to free balloon races is added by Ralph H. Upson, the winner of the 1913 international event, who is now the chief aeronautic engineer of the Goodyear Company.

#### Personal Par

Walter A. Pack who was a civilian instructor in the Air Service at Wilbur Wright, Chanute, and Ellington Field has left for Lima, Peru, to join C. W. Webster in the interests of the Curtiss Aeroplane and Motor Corporation.

#### Modern Drilling Practice

Modern Drilling Practice (The Industrial Press, New York), by Edward K. Hammond, a treatise on the use of various types of single and multiple drilling machines including their application to standard and special operations, has just made its appearance. A book of this kind and caliber will fill a place peculiarly its own. During recent years a number of important changes have been made in arilling holes in the parts of manufac-tured products. Noteworthy among these changes are the great increase in the speed at which twist drills are operated, the application of various types of universal or special multiple spindle drilling machines and the successful employment of semi-automatic drilling machines.

These changes have all been put into practice for the purposes of increasing production and the Author's object in producing this book has been along the same lines. The methods described throughout the book are those which have been thoroughly tested and found to be practically. practicable.

Probably no class of cutting tool used in the machine shop comes in for as little consideration as the twist drill and on that account drills are apt to be taken for granted far more than should be the case Therefore the author has gone into the subject conscientiously and has succeeded in a clear and readable manner of putting the importance of drill consideration to the fore.

The book is well illustrated and should be of more than passing interest to the

manufacturer.

#### Tie Vote On Buying Big Wright Plant

Washington.—Final action on the bill making available more than \$9,600,000 for completing the development of more than thirty army camps and aviation fields, including purchase of land at several places, was delayed on December 12 in the House by demand for reading of the engrossed bill.

Before a final vote to-morrow on the passage of the bill, effort will be made to restore a provision for the Government purchase of the Dayton-Wright aeroplane plant and adjoining field at Dayton, Ohio, for \$2,740,000. On a tie vote the purchase of the Dayton plant was tentatively eliminated from the bill

minated from the bill.

Before voting on the Dayton plant, the House tentatively approved purchases of the Curtiss-Elmwood plant at Buffalo, for \$1,804,000. Other large expenditures approved were for the development of Camps Brag, North Carolina, and Knox, Kentucky.

Efforts to add provision authorizing expenditures at various camps were defeated, excepting a proposal of Representative Longworth, Republican, Ohio, for spending \$180,000 for land at the nitrate plant site, near Cincinnati, Ohio.

#### Four Get Pilot's License

A. C. Mackie of Roslyn, Long Island, is one of the first civilians to pass his flying tests for an Aero Club license, After a remarkably short course of in-After a remarkably short course of instruction at the Curtiss Flying School at Garden City, L. I., Mackie made his solo flight on December 1st and on the following day passed his tests. Another student who recently completed his instruction at the Curtiss School was F. B. Parada of Mexico City, Mexico. One of the youngest fliers graduated was W. the youngest fliers graduated was W. Russell Beeler of New Albany, Ind. He completed his instruction and received his The only girl student to receive a pilot's license this year was Laura Bromwell of Cincinnati, O., who bears the distinction of being the first woman to receive a flying license since 1916 and one of less than a dozen need. United States. dozen licensed women fliers in the



The Bleriot aerobus, equipped with 4-300 H.P. motors, wing spread of 80 feet and height of 21 feet, with a maximum speed of 100 miles per hour. It carries 28 passengers

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M. Miller Lawton V. Smith E. Hamilton Lee Loster F. Bishop Walter J. Smith Harold T. Lowis Walter H. Stevens Herbert M. Crader

Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton
Robert H. Ellis
James H. Knight
Elmer G. Leonhardt
Paul S. Oakes
Paul W. Smith
Frederick A. Robinson
Max Miller
F. A. Nutter

#### Extension of Aero Mail Schedule Proposed

Washington.-Further details of the proposed extension of the aeroplane mail proposed extension of the aeroplane mail service to the Pacific coast and to Atlanta, Georgia, and of the establishment of the new line between St. Paul and Minneapolis, Minnesota, and St. Louis, Missouri, within the next year, were given to the House Post Office Committee by Otto Praeger, Assistant Postmaster General.

With the new lines in corretion Management of the Pacific Committee of the power lines in corretion.

ter General.

With the new lines in operation, Mr. Praeger said the deliveries of New San Francisco mail would be speeded up two days and the Atlanta-New York mail would be speeded up by 12 to 14 hours.

An appropriation of \$3,000,000 for con-

tinuation and extension of the mail service was requested, but the committee deferred decision.

#### Praeger Reports Great Progress in European Aerial Mail Services

Washington, D. C.-Second Assistant Postmaster General Otto Praeger made some interesting comparisons of aerial mail progress here and abroad in his ad-

dress to the postal employees assembled in the "Little Theater" on November 8. "Today it is the boast of the Air Mail Service of the Post Office Department of the United States that we have eight aeroplanes in the air daily, covering a total of 1906 miles of teritory and carrying an aggregate of 2,100 pounds of mail. Compare this with the information contained in an official report from London, detailing the status of the aeroplane postal service in Great Britain at the close of the month of September, 1919. This report discloses that 'fifty-four Government aeroplanes were transporting mails daily from one part of the country to another, the latest routes including Bristol, Birmingham, Newcastle, Manchester and Glasgow; also that multiple motor. Handley-Page aero-planes were carrying 1,400 pounds of let-ter mail to Brussels for forwarding to Holland and Norway, and bringing back on the return trip 2,000 pounds of Continental mail.' Compare that with the American service and its small discarded war planes, all eight of which operating in a day carry but 2,100 pounds of mail. The report states that in addition to these operations which are by Government machines 'other aeroplanes under civilian contract with a total mail carrying capacity of 4,750 pounds were also operated." I have just received a copy of an offi-

cial British report advising that with the idea of facilitating civilian mail relations with France, a bi-weekly aeroplane service has been operating since July 8th between Constantinople and Bucharest, where the mail is handed over to the Orient Express. The report says, 'The participation of aviation enables the mail to arrive in Paris in six days from the day of postage. is hoped to reduce this time to four days when the Constantinople-Agram line is opened.'

'An air mail service has also been operating for some time between Constantinople and Salonica, and also between Athens and Salonica; while the Turkish Postal Service is now preparing an air mail service between Stamboul and Sam-soun on the north coast of the Black Sea. These developments in the Near East have been through the initiation and encouragement of the French Government.

## CONSOLIDATED STATEMENT OF OPERATIONS OF AIR MAIL SERVICE, JULY 1, 1918, TO JULY 1, 1919

	Trips Possible	Trips Attempted	Trips Defaulted	Weather Encountered		Mileage	Miles	Percent of Per-	Mails Carried	Cost of	Forced Landings due to:	
Month				Trips in Fog, Etc.	Trips Clear	Possible	Traveled	formance	(Pounds)	Service	Motor	Weather
1918												
July	108	106	2	41	67	12,150	11,855	97.57	16,967	\$10,001.46	4	4
August	100	109	0	17	92	11,988	11,984	99.96	16,588	9,555.67	I	I
September.	100	100	0	36	64	10,900	10,900	100.00	15,200	9,638.74	2	1
October	108	108	0	24	84	11,772	11,617	98.68	16,788	9,841.76	2	0
November.	104	102	2	24	80	11,336	11,118	98.07	16,854	10,673.68	0	I
December.	104	91	13	50	54	10,896	8,415	77.23	17,778	13,300.46	7	II
1919			,						0 .			
January	108	92	°16	53	55	11,772	9,653	82.00	18,105	13,741.58	I	5
February	97	92	5	42	55	10,554	9,307	88.18	15,489	13,645.16	6	8
March	106	102	4	34	70	11,554	10,699	92.59	17,531	13,880.29	5	5
April	107	105	2	32	75 86	11,682	11,105	95.06	16,677	13,516.44	2	7
May	160	156	4	70		23,296	22,578	96.92	26,627	17,715.66	_2	6
June	224	224	0	88	136	30,943	30,835	99.53	35,647	30,891.62	4	4
Totals	1,435	1,387	48	. 511	918	166,843	160,066	96.54	230,251	\$166,402.52	36	53

#### THE MAGNIFICENT MILLION DOLLAR HOUSE OF THE AERO CLUB OF AMERICA AND AERIAL LEAGUE OF AMERICA



The Aero Club of America, owing to its extensive national and international activities and large and growing membership had long ago found its very artistic Club House at 297 Madison Avenue, which it has occupied for nine years, too small. After a thorough review of the available buildings in the most exclusive club and residential section of New York. City, the Board of Governors selected the magnificent Club House at 112 Central Park South, overlooking Central Park, in the most exclusive club and residential section of New York.

While the Board of Governors were considering ways and means of acquiring this building, two progressive members of the Club, Commodore Louis D. Beaumont and Harmon S. August, bought the building, to make it available to the Club.

The new Club has an imposing grey stone facade of 75 feet facing Central Park. The building is 110 feet deep and has five stories besides the basement, where the bowling alley, billiard room, meeting room, grill, and barber shop are located. It was built from plans by the noted architects, McKim, Mead and White.

On the first floor are spacious reading, writing, reception, and ladies' dining rooms, and an artistic banquet hall and ballroom 75 feet by 30 feet. On the second floor are the auditoriums, private dining rooms, guest rooms, library, models and trophies room, etc. The third and fourth floors are devoted to spacious suites of two rooms and bath, on the fifth floor are eighteen single bedrooms. Above is another floor of store rooms and employees' quarters. There are, in all, including the basements and subbasement, eight floors in the house.

Work on decorating and furnishing the house has started and it is hoped to have it ready in six weeks.

Besides affording more space for the extensive official work of the Aero Club of America and the Aerial League of America, this new Club House will have a first class dining room and private rooms for luncheon, dinner and tea parties, and a section for ladies, including a tea room, where tea will be served ev

## THE CHICAGO AERONAUTICAL SHOW

IT is to be a display of contrasts that the first aeronautical show will offer when the great exhibition of aircraft opens January 8 at the Coliseum in Chicago.

For the entire history of aviation, its problems and triumphs, will be related in the several hundred types of aircraft shown and they will be explained by the engineers and pilots who have made the most modern science—that of flight—"safe

for democracy."

Most of all, though, the show will be the first post-war opportunity to study war achievements—those accomplishments so carefully concealed by censors during the conflict. Anti-aircraft guns, radio telephones, air missiles of all sorts from machine guns and tracer bullets, to the aerial bomb and torpedo, will feature the military display. Captain Eddie Rickenbacker's bullet riddled Spad will be shown for the first time. Rickenbacker, too, will appear throughout the show.

But the contrasts will prove the conquest of the air. Lincoln Beachey's primitive plane in which he looped the first loop will be next the new fashionable upholstered limousines which withstand every touch of weather. The first JN-4 mail ship, with a year's service, will fly from New York to take its place in the show next the new Thomas-Morse "mail truck of the air," which carries two tons of mail with trigger attachments for deliveries

Giant dirigibles, steel propellers, new safety parachutes and every other instrument devised for the navigation of the air will compose other features of the display.

#### Aerial Age Weekly

AERIAL AGE will have an information and service station at the show for the benefit of its many clients and subscribers in the Middle West.

AERIAL AGE holds many distinctions, among them (1) that of having been the

first publication in the United States to urge the creation of the Council of National Defense and having continued the campaign of national education which resulted fifteen months later in the creation of the Council and, subsequently, the creation of the Aircraft Production Board.

(2) That of having been the first publication to donate advertising space for the Mobilization of Industries, for Recruiting and for the Liberty Loans.

(3) That of publishing twice as much technical material and trade and news

items as any other aeronautic publication.

(4) That of publishing weekly the complete official reports of the Army and Navy Air Services, together with articles by the recognized authorities on Military and Navy aeronautics, thereby insuring to the reader a more complete representation of Army and Navy aeronautics than is afforded by any other publication in the United States.

(5) That of always publishing articles on technical developments written by authorities on the subject, refusing the purely theoretical essays of men who have not had actual experience in original research, in the factory or in the field, whose theories only lead to costly failures to those who adopt them.

(6) The distinction of having carried a larger amount of advertising in 1919 than any other publication.

There are many other distinctions, but the above explains how Aerial Age became the National Technical Engineering and Trade Authority.

## American Aircraft & Supply Works Exhibit

The American Aircraft & Supply Works will exhibit a new type of sport plane. The following information has been supplied by the manufacturer:

The Amairco sport plane was designed by Mr. Charles H. Patterson to meet the demand of a small, inexpensive, yet strong, safe and serviceable airplane which would not require the services of an expensive mechanic and would be otherwise very economical in upkeep.

The speed range of this machine is estimated at from 26 M. P. H. to 60 M. P. H., which insures a landing speed low enough to enable any one to land within a very small field.

One man can, if necessary, set up or take down this machine within a very few minutes, and by taking off the wings and tail surfaces the parts are reduced to such a small compass that it can be easily rolled into an ordinarry garage or similar space.

By reason of the X strut system of wing bracing used the trouble of lining up the wings is eliminated, which is a very important feature in itself, as a great many pilots cannot line up a plane correctly.

Notwithstanding the low selling price (\$1,650), all materials used are of the best obtainable and rigedly inspected before they can become part of the plane.

Carefully selected spruce wood is used

Carefully selected spruce wood is used throughout and after being made up into wings, fucilage, etc., are carefully filled and varnished for protection from weather conditions, etc.

The landing gear "Vs" are made from 1/8" spruce and 1/8" birch laminated to a thickness of 1", which is then shaped to a streamline. A covering of grade "A" fabric is then doped on, covering the entire wood part, thus adding strength and protection and making a very light and serviceable landing gear. The axle is of steel tubing of sufficient strength to resist bending and is enclosed in the usual steam line of wood.

The fuselage is 12' 8" long, 23½" wide and 25" high. The longerons are 1½" tapering to ¾". The fucilage is divided into nine stations, double wired half way from nose, using 1300 pound cable; plated



The Dayton-Wright Model K-T Cabin Cruiser, equipped with 420 H.P. Liberty Engine

wire is used in the rear half, making a fuselage strong enough for a more powerful motor than the 30 horsepower motor

Wings are all spruce with metal trail-

Wings are all spruce with metal traning edge.
Front beams 1" x 3½", not channeled.
Rear beams 1" x 2½", not channeled.
Ribs are built up somewhat similar to
the usual method, but are wrapped with
tape ¾" wide at five places in length,
which is doped on, thus making a wing
strong enough for a much heavier machine. No. 12 gauge plated wire is used
in the wing as a drift and anti-drift in the wing as a drift and anti-drift bracer.

The X strut (interwing) is made of %" x 18 gauge steel tubing securely fastened and brazed at the intersection and is then faired with bass wood and covered with Grade "A" fabric and doped.

The flying and landing wires are ½8" cable, used single. All external metal fittings are nickel plated.

#### Power Plant

The motor is of the radial type, 5 cylinders, 3¼" bore, 4½" stroke, rated at 30 H.P., designed by Charles H. Paterson, especially for the Amairco sport

The cylinders are air cooled and project out from the aluminum cowl. exhaust is piped off to the two sides of the fuselage.

Motor weighs about 100 pounds. Gas consumption, 2 gol. per hour. Tank capacity, 10 gal. Cruising range, 300 miles.

#### General Specifications

Span, upper plane22 ft.
Span, lower plane
Chord, both planes 4 ft. 3 in.
Gap 2 ft 10:
Gap 3 ft. 10 in.
Overall length
Wing curveeiffel 36
Areas
Upper plane, including aileron96 sq. ft.
Lower plane
Ailerone each
Ailerons, each
Stabilizer 9 sq. ft.
Elevators, each 5 sq. ft.
Rudder 6 sq. ft.
Fin, weighs
Weights
Empty
With pilot
Weight per H.P
Load per sq. ft. fully loaded 3 lbs.
Useful load
Useful load
Performance
Speed at full power
Landing speed 26 M D II

#### Brewster-Goldsmith Co. Exhibit

The Brewster-Goldsmith Co. will exhibit their spark plugs, which have escorted a number of the most interesting records of late.

Lieutenant-Colonel Reynolds used a set of B-G plugs, which were installed at Langley Field, Virginia. He flew these to Mineola, then across the continent and back, and finally returned to Langley Field. No change of plugs was required and they were functioning properly on their return to the home field.

Captain Donaldson's and Lieutenant Manzelman's B-G plugs also gave perfect account of themselves despite the length of the flight and the serious weather conditions encountered. Lieutenant-Colonel Reynolds used a set

ditions encountered.

The official report of Lieutenant-Colonel R. S. Hartz's "Rim" flight states that a set of H-G plugs gave a perfect performance in that gruelling 9283-mile flight. The set of plugs used were tested



Mr. Charles H. Paterson of the American Aircraft and Supply Works

for 30 minutes in a D-H prior to the flight. While on the flight they had 24 flight. While on the flight they had 24 hours 25 minutes warming time and approximately 114 hours 45 minutes flying time—a total of 140 hours.

The Martin biplane, with the exception

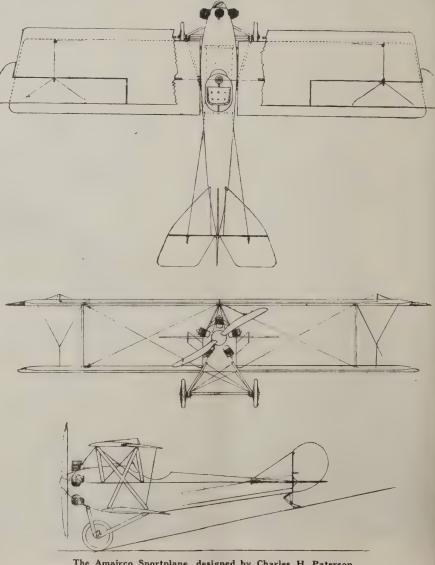
of two nights, was out of doors without protection between July 24 to November 9. After standing for 31 days at Jay, 9. After standing for or day, N. Y., where it was held for repairs, the left motor was cranked on the first try and the right motor started on the second try, although the engines had been idle in the open under all possible climatic changes during that period. Not once during the entire flight was a spark plug miss recorded and never was difficulty in starting the engines attributable to the failure of the ignition system.

It is apparent that the new features of design embodied in the B-G plug are important improvements, and their success in the recent competitions justifies the conclusion that they will function reliably and faithfully in the highest compression engines used on aircraft and reduce by a large percentage the renewals required.

A technical description of the plugs was printed in Aerial Age for November 10-17, 1919.

#### Caproni Company Exhibit

The Caproni Company is exhibiting models of a giant triplane which has been famous since 1915, when it made its first appearance. This triplane has a spread of 130 feet. It is equipped with three 400 H.P. engines, two of them in tractor position at the nose of the fuselage, and one a pusher at the rear of the central nacelle. This machine has climbed to an altitude of 14,000 feet with a ton of useful load



The Amairco Sportplane, designed by Charles H. Paterson

and with only two of the engines running. The triplane was used as a bomber, but has been converted into a passenger carrying machine.

#### Aerial Mail Exhibit

The Aerial Mail Service will exhibit the first JN-4 mail plane with a record of a full year's service. This ship is equipped with Hispano-Suiza motors, and to show that this plane is still in good condition, will be flown from Chicago to New York

#### The Curtiss Exhibit

Four distinct types of peace-time aeroplanes, each representing the last word in commercial and pleasure flying craft, together with the greatest fighting plane in the world, will be shown by the Curtiss Aeroplane and Motor Corporation. Included in the exhibit will be the company's latest achievement in aeronautical motors and also a miniature model of the Curtiss wind tunnel and models of the machines which have been produced by the company during the past year, among them the now famous NC (Navy Curtiss) 4, which was the first aeroplane to cross the Atlantic Ocean.

Interest will undoubtedly be centered in the Curtiss Eagle, eight-seater aeroplane—the modern aerial Pullman—and in the Curtiss Wasp, which now holds the world's altitude record of 34,910 feet, in addition to the world's records for climb and speed. The other aeroplanes in the exhibit include the Curtiss Oriole, the first three-seater land plane produced in America; the Curtiss Seagull, three-seater flying boat; the Curtiss JN-4D, the standard training plane; the Curtiss six and twelve cylinder motors, the year's sensations in aeronautical power plants; and the Curtiss OX-5, probably the best known and widest used motor in the world.

These products are for the most part the result of the year's activity on the part of the Curtiss Aeroplane and Motor Corporation, which, like all other American aeronautical manufacturers, at the beginning of the year found itself confronted with the problem of changing from an enormous war-time production basis, which extended over a three-year period, during which the company was engaged in building aeroplanes and flying boats for the U. S. Army and Navy, as well as for the Allied governments, to a peace-time basis

While the process of production-transformation was going on, the Curtiss Com-

pany determined to pioneer the way for commercial aviation.

In order to accomplish this, W. W. Mountain, vice-president and general manager of the company, perfected a commercial sales organization with J. P. Davies, formerly of the U. S. Air Service, as sales manager. Following methods used by automobile manufacturers, an organization of distributing companies with dealers' sub-agencies was built up. As a result of this plan, the United States is now covered with a network of distributing agencies handling Curtiss products. At the same time agencies have been established in many foreign countries. Simultaneously, Curtiss designers and engineers began work on peace-time planes—this work culminating in the design and construction of the Curtiss Eagle, the first three-motored land plane built in America.

The activities of the year may be summed up as follows:

Transformation from a war-time to a peace-time production basis, involving the concentration of its many plants.

concentration of its many plants.

The completion of the NC (Navy Curtiss) 1, 2, 3 and 4 for the United States Navy's trans-Atlantic achievement.

The organization of a regional system of distributing agencies.

The construction of the Wasp triplane. which, during the year, established world's records for altitude, speed and climb.

The design and construction of the HA mail plane, the fastest single-motored plane in the aerial mail service.

The purchase from the government of the surplus supply of training planes and provision for their resale to private purchasers, involving the establishment of service stations for overhauling and also concentration centers with the organization of a service personnel.

The design and construction of the Curtiss Oriole, the first three-seater land plane in America.

The design and construction of the Curtiss Seagull flying boat, the first three-seater water machine.

The design and construction of the Curtiss Eagle, eight-seater, three-motored land plane.

The dispatching of missions to South America and the Far East to stimulate interest in American aeronautics in the Latin-American republics.

The development and refinement of the

six and twelve cylinder motors.

Promotional work in the way of actual flying operations, schools and experiments in aerial transportation.

Co-operation, in conjunction with municipalities, in the establishment of municipal landing fields.

Because it meets the popular demand for an aeroplane of medium size to be used to transport either passengers freight at low operating cost, the Curtiss Eagle has been hailed by aviation authorities as the type of plane that will popularize aerial transportation. Its multimotor equipment—three Curtiss Six, 150-horsepower motors—provide insurance against the dangers of forced landings and at the same time give speed, endurance and economy of operation. Its cabin, fully enclosed, provides comfortable ac-commodation for its passengers who, while protected from the wind and cold and, to some extent, from noise, are enabled to travel with much the same ease as in a parlor car or limousine, viewing the landscape through non-breakable glass windows. The cabin, provided with wicker chairs, with plenty of aisle space, is entered from a side door. The motors are equipped with self-starters.

The Eagle has a maximum speed of 105 miles per hour and lands at approximately 50 miles per hour. It has a flying radius of 350 miles at full power or 475 miles with the motors throttled. It has a wing span of 61 feet 4 inches. Its length is 36 feet 9 inches, and its height is 12 feet 4 inches. Its gross weight is 7,450 pounds and its useful load 2,320 pounds.

The Curtiss Wasp is a fighting plane, designed to meet the requirements pursuit plane at a time when the American aviation section was without a machine canable of competing successfully against those of the Huns. Although the Wasp did not reach the fighting lines, subsequent performances, together with the testimony of pilots who have flown it, have stamped it as one of the most formidable fighting planes in the aeronautical Equipped with special altitude wings and with the Curtiss K-12 400horsepower motor, the Wasp, in September, 1919, piloted by Roland Rohlfs, Curtiss test pilot, ascended 34,910 feet, establishing a new world's altitude record, and on the following day made a new world's record for climb-20,000 feet in ten min-With military load, consisting of utes. machine guns and ammunition, the Wasp made a record of 162 miles per hour in government speed tests. Several of these machines have been built and sold to the U. S. Navy and the Bolivian government has added the Wasp to its aviation equip-



The Le Pere biplane, equipped with super-charger, in which Major R. W. Schroeder made the high altitude speed record of 137 miles an hour at 18,400 feet

The standard Wasp model has a wing The standard Wasp model has a wing span of 31 feet 11 inches, and a supporting surface of 309 square feet. It is 23 feet 3 inches long and 9 feet 10½ inches in height. The machine weighs, fully loaded, 2,900 pounds and carries a useful load of 1,000 pounds. Its maximum range at economic speed is about 550 miles.

The Curtiss Oriole, first three-seater

The Curtiss Oriole, first three-seater land plane built in America, was designed to meet the demand for a plane with the dependability and stability of the well-known Curtiss JN, yet adapted more to the peace-time requirements of space for an extra passenger, greater speed, additional fuel capacity for cross-country work and greater attention to the niceties which make for comfort. The front cockpit is wide, the passengers having plenty of room seated side by side, in deep, leather-upholstered seats, protected by a curved windshield. A cut-in side door is a modern up-to-date convenience, while a self-starter does away with the necessities

a modern up-to-date convenience, while a self-starter does away with the necessities of hand-cranking.

The Oriole is 25 feet long and 9 feet 6 inches in height. It has a wing span of 36 feet. It is equipped with the Curtiss Six, 150-horsepower motor, which gives it a speed of 96 miles per hour. It lands at 50 miles per hour. Its flying radius is 290 miles at high speed or 440 miles with the motor throttled. Its weight, with a useful load of 790 pounds, is 2,354 pounds.

The Oriole won its place with the discerning aviation public almost instantly and has been in great demand since its announcement. This model has contributed much to aviation history during its first year. One of these machines was flown from Buffalo to Houston, Texas, and back to New York, carrying three passengers. The round trip, covering 5,000 miles, was made in less than 40 hours actual flying time. The Oriole has blazed actual flying time. The Oriole has blazed the trail as an aerial carrier in the oil fields of Texas and Oklahoma, many being used by oil operators.

Oriole that made the record-breaking flight between Buffalo and New 440 miles in four hours and five minutes; also between Los Angeles and San Francisco, the round trip in a single day. Orioles are now operating in the mountainous country of Colorado and in the South American countries.

The Curtiss Seagull, designed for the same purpose as the Oriole, is a threepassenger flying boat in which Curtiss designers have succeeded in combining comfort, large flying radius, speed, up-todateness and safety into one design. The result has been a flying boat which has

been in demand by lovers of water sport. It is ideally adapted to pleasure flying, making possible aerial pleasure cruises of from three to four hours' duration without refueling. The passenger compartment is wide and roomy, the seats leather upholstered. The windshield affords protection from wind and spray and, at the same time, does not detract from the wonderful vision which is obtainable from the sky. The Seagull's utility is not confined to pleasure flying-it is admirably suited for

carrying passenger and package.
It belongs to the small flying boat class, being 28 feet 10 3/16 inches long and 11 span of 49 feet 93/3 inches long and 11 feet 9 3/32 inches in height. It has a wing span of 49 feet 93/4 inches. The total weight with a full load is 2,726 pounds, and it carries a useful load of 769 pounds.

Seagull is equipped with the Curtiss Six, 150-horsepower motor and has a maximum speed of 76.5 miles per hour and a minimum speed of 48.5 miles per hour. Its endurance is 288 miles or 4.8 hours at economical speed. A self-starter is one of the modern conveniences in the Seagull's standard equipment.

Like the Oriole three-passenger land machine, the Seagull immediately won popular approval. Its performances during the first year of production have added a remarkable chapter to 1919 aviation his-The first Seagull, shipped to the

Scandinavian countries, has been successfully flown more than 5,000 miles under all tully flown more than 5,000 miles under all conditions. It has made two record-breaking flights—one a cross-country journey from Christiania, Norway, to Stockholm, Sweden, and another, a 1,000-mile trip between Christiania and Helsingfors, Finland, touching at Skagen, Denmark, Copenhagen and Stockholm. Seagulls were used in inaugurating a regugulls were used in inaugurating a regularly scheduled transportation line be-tween San Pedro and the Catalina Islands. Another Seagull is now on a 5,000-mile trip from New York to New Orleans, following the Hudson, St. Law-rence, Ohio and Mississippi waterways.

The Curtiss six and twelve cylinder mo-tors developed during the year have taken their places with the world's most efficient aviation motors.

The Curtiss K-6, which is the motor equipment for the Oriole, Seagull and Eagle, is en bloc type, rated at 150-horsepower at 1,700 revolutions per minute. It is of aluminum construction with a 4½inch bore and a 6-inch stroke. It weighs 417 pounds and its gasoline consumption is 0.53 pounds per brake horsepower hour. Lightness—it weighs less than any other six-cylinder motor— economy of operation and dependability are characteristics which have commended its general use.

The Curtiss K-12, which is the motor used in the Wasp when the world's records for altitude, speed and climb were made, is a Vee-type, en bloc motor, rated at 375 horsepower at 2,250 revolutions per minute at the crankshaft. It is of aluminum construction with a 4½-inch bore and a 6-inch stroke. It weighs 728 pounds and its gasoline consumption is 0.53 pounds per

The Curtiss JN-4D—a number of which will be exhibited by George W. Browne, western distributer for the Curtiss Aeroplane and Motor Corporation—is the plane in which 95 per cent of all American and Canadian aviators received their instruc-



The Curtiss "Eagle" eight-passenger biplane, powered by three K-6 engines and piloted by Roland Rohlfs, the holder of the world's altitude record, made its first public demonstration flights at Roosevelt Field, L. I. Among the passengers carried in the "Eagle" were J. Bernard Walker, Hugh L. Willoughby, of the Technical Committee of the Aero Club of America; F. A. Steele, Ernest Wellick, Evan J. David, G. Douglas Wardrop, managing editor, and Edgar H. Felix, associate editor, of AERIAL AGE WEEKLY. The "Eagle" is well streamlined and luxuriously furnished. There is a compartment for luggage at the rear and as an express carrier the plane has the capacity of one ton. The maximum speed of the plane is 107 m.p.h.; the gross weight, 7,450 pounds; landing speed, 54.5 m.p.h.; climb, 4,075 feet in ten minutes; cruising radius, 350 miles in 3 1/3 hours at full-power flight; span, 61 feet, 4 inches; wing area, 770 square feet



The Curtiss "Wasp" Triplane with which Roland Rholfs established a new official World's Altitude Record of 30,700 feet. Machine has a span of 32 feet, is 23 feet long, and weighs 1900 lbs. The engine is a Curtiss "12" rated at 400 H. P.

tion. It was the standard training plane at all of the aviation fields. Stability, maneuverability, simplicity, steadiness and low landing speed combined to make it the premier training plane in the world. Equipped with the OX-5, 90 horsepower motor, gave to the JN additional qualities of dependability and economy. Thousands of these planes were built at the various Curtiss factories during the war period. Since the signing of the armistice, the JN type, by reason of the confidence imposed in it by army fliers, has been in use in all parts of the country and it, more than any other type, may be said to have paved the way for the era of commercial aviation. Thousands of people have experienced their first delights in flying in the Curtiss JN. It has been put to hundreds of commercial tests. It was the first aerial mail plane. It was the first to carry merchandise. It is being used by doctors. A clothing establishment used JN's in experiments with regularly-scheduled aerial deliveries. Ranchers, rangers, aerial photographers, surveyors, engineers, architects, foresters are now using the JN as a part

of their equipment.

The JN-4D has a maximum speed of 75 miles per hour and a landing speed of approximately 45 miles per hour. Its economical range is about 150 miles. It is 27 feet, 4 inches long, has a wing span of 43 feet, 73% inches and is 9 feet, 105% inches in height. Its gross weight is 2,025 pounds and its useful load, 490 pounds.

#### The Dayton-Wright Exhibit

The Dayton-Wright Company will exhibit several commercial models of which the following are the specifications:

the following are the specifications:
The three-passenger Aerial Sedan Model OW-1 (equipped with the Hispano-Suiza "E" Motor) and its great supporting surfaces, affords all the safety and luxuries of the modern limousine of the road.

No pains have been spared in the refinement of all structural details, in that every component part has been designed and built to withstand many times the strain which the plane would be normally re-

quired to bear. Material for the wood construction is all carefully selected from properly seasoned, high-grade spruce—the ideal wood for aeronautical purposes. Infinite care is taken in the inspection of every part—metal, wire, wood and linen—before and after fabrication, assuring absolutely first-class workmanship.

For night flying the Holt Flare Lights on this ship supply ample illumination for landing.

This plane is especially adaptable to moderate cross-country flying, as it carries sufficient fuel capacity for approximately five and one-half hours continuous flying.

The cabin is peculiarly suited for the most exacting passengers. The comfortable seats, luxuriously upholstered, require no carmping position; accommodations have been provided for necessary baggage,

and absolute protection is afforded against the elements. The complete visibility of the cabin is another feature worthy of note.

The usual noise from the motor is completely deadened within the cabin, and conversation can be carried on in a normal tone of voice. This should appeal to the time-saving man in transacting business with an associate while enroute, or the ranch owner with his superintendent taking a survey over his interests, etc. For pleasure purposes, the advantages of this machine are self-evident.

## The Exhibits Specifications

#### General Dimensions

#### Areas

Wings, upper, including ailerons (2 wings @ 133.5 sq. ft.) 267.00 sq. ft.

Wings, lower, including ailerons
(2 wings @ 133.5 sq. ft.) 267.00 sq. ft.
Ailerons (4 @ 15.5 sq. ft.) ... 62.00 sq. ft.
Horizontal Stabilizer ... 40.00 sq. ft.
Elevators (each 11.4 sq. ft.) ... 22.8 sq. ft.
Rudder (balanced) ... 15.63 sq. ft.

Total supporting surface...534.00 sq. ft.

#### Weights and Loading

Net weight empty		. 1450	lb.
Gross weight loaded		.2492	lb.
Useful load		.1042	1b.
Fuel 70 cal @ 5 05 1b 417 50	11		

Fuel, 70 gal. @ 5.95 lb.. 417.50 lb. Oil (crankcase & tank)

7 gal. @ 8 56.00 lb. Water (jackets & core) 8.8 @ 8.33 73.50 lb.



A few Curtiss Orioles being put through final tests at the Curtiss Field at Buffalo



Pilot (average)..... 165.00 lb. 2 passengers or other load 330.00 lb. 

Bore & stroke

 $120 \text{ m/m} \times 130 \text{ m/m-4.724}" \times 5.118"$ Fuel tank capacity......70 gallons Fuel consumption per hr.

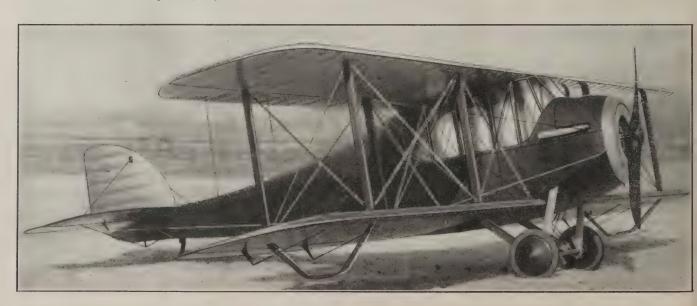
(economical) 13 gal. per hr. Oil capacity-tank and crankcase.7 gallons Oil consumption per hr.

(economical) 0.5 gal. per hr.

Nose radiator (Honeycomb Harrison type)

#### Performance

Speed, maximum horizontal flight
95 miles per hr. (estimated)
Speed, minimum horizontal flight
35 miles per hr. (estimated)
Radius of action (economical fuel)
5.4 hours (estimated)
Radius of action (economical fuel)
100 hours (estimated) 10.0 hours (estimated)





The DH 4, manufactured by the Dayton-Wright Co. Used for Pursuit Work

#### Note:

Oil capacity is greater than fuel capacity in comparison to radius of action. Provision for this was allowed due to variations in lubricating oils.

The six-hour cruising radius of the "KT" Cabin Cruiser makes this ship particularly desirable for covering greater distances at a higher rate of speed. The clear vision cabin with its comfortable contains a grangement affords all the conseating arrangement affords all the conveniences of modern traveling.

This is purely a commercial ship and is built for either passenger or freight carrying; for the latter by merely removing seat provided for the passengers.

The high factor of safety is a prominent feature of the "KT" as it has in its construction the usual high grade Dayton-Wright workmanship.

It is powered with the Liberty Twelve 420 H.P. motor, giving a maximum speed of 120 miles per hour, most adequate for general use. The merits of this motor were proven in the great war, when machine covined with them accomplished. chines equipped with them accomplished such wonderful results over the front when the reliability of the motor meant so much.

#### Specifications

#### General Dimensions

Wing	span—upper	plane	 	.43' 71/2"
Wing	span-lower	plane	 	.43' 71/2"
Depth	of wing cho	rd	 	5' 6"

Gap between wings5' 10"
Stagger
Length of machine overall30' 19/16"
Height of machine overall11' 2½"
Angle of incidence 3 degrees
Dihedral angle 3 degrees
Sweepback0
Wing curve
Horizontal Stabilizer angle of incidence
plus ½ degree to plus 5½ degrees

Areas
Wings, upper, including ailerons
212.36 sq. ft
Wings, lower, including ailerons
214.36 sq. ft
Center Section 14.37 sq. ft
Ailerons (each 17.9 sq. ft.) 71.6 sq. ft
Horizontal stabilizer 38.42 sq. ft
Verticaal stabilizer (fin) 6.00 sq. ft
Elevators (each 12 sq. ft.) 24.00 sq. ft.
Rudder 13.48 sq. ft
Total supporting surface441.09 sq. ft.

## Loading (weight carried per sq. ft.

	of su	ppoi	ting	surface	e)	9.3	1b.
Loading	(weight	per	B.H.	P.)		9.82	lb.
Factor o	f safety	7					. ,6

#### Weights

Net weight, machine empty	.2686 lb.
Gross weight (machine, oil, gas,	
water, 2 passengers & pilot	4128 lb
Ticeful load	1///2 15:

Fuel (gasoline) 128 gal.	
@ 5.95 lb.	761 lb.
Oil, 13½ gal. @ 8 lbs	108 lb.
Pilot	174 lb.
2 passengers	308 lb.
Water, 11 gal. @ 8.33 lb	91 lb.
_	
Total	1442 lb.

#### Performance

120 M.P.H.
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Speed—minimum horizontal flight
55 M.P.H.
Climbing speed10,000 ft. in 10 min.
Radius of action (economical)6 hours

#### Motor

Model—Liberty 12 cylinder 4 cycle.
Horsepower rated at 1700 R.P.M420
Weight per rated horsepower2 lb.
Bore and stroke
Fuel consumption per hour
(economical) 21 gal.
Fuel tank capacity
Oil capacity provided

#### Edstrom Machinery Company Exhibit

The Edstrom Machine Co. will display one of their wire-wrapping machines, which have been officially inspected by the Navy Department and the Department of Military Aeronautics. By means of this machine, operated by a crew of two men, a neat and strong wrap can be made in 45 seconds, which is of better workmanship than can be produced by the most skilled hand labor. In official tests the machine wrap stood 100 per cent of the tensile strength of the wire on which it was made, amounting to more than 4200 pounds. A test of this wrap, without soldering, resulted in none out of ten wraps withstanding the full tensile strength of the wire, the tenth giving way at 71 per cent.

One aircraft manufacturer stated that this machine enabled two men to turn out as many wraps of a much better quality as could be obtained by manual wrapping

of twelve to twenty men.

#### Flying Magazine

Flying Magazine will be represented by members of its editorial staff and will co-operate with all exhibitors in supplying authoritative information concerning foreign and domestic aircraft markets.

Flying was founded in 1911 by Messrs. Robert J. Collier, Henry A. Wise Wood and Henry Woodhouse, to develop American aeronautics on the broadest scale possible. Since 1911 Flying has done the

pioneer work in getting:

1. Aerial Preparedness—Creating the public interest and urging Congress to make the large appropriations for aero-

2. The creation of aerial reservesleading about 300 young men to learn to fly, some at private and some at their own expense to be available in case of an emergency—which found them ready when war came. Also creating the interest which led thousands of college men to join in the Army and Navy Air Services.

establishing of the Aerodynamic Laboratories needed to conduct the researches necessary to develop better and safer aircraft. When Flying started this campaign there were no aearodynamic

laboratories in America.

4. Developing a sound and efficient aeronautic industry, obtaining the necessary government and public support for the industry in its various periods of development.

5. Developing safety in flying, both by

explaining new devices and by publishing the advice of flying instructors.

6. Developing Pan-American aeronautics with regard to the enormous business possibilities available by means of aerial transportation.

7. Introducing aeronautics in universi-

ties and colleges.

8. Developing aeronautic sport, which for close to four years was the Ameri-



Maurice Wetzel of the Sky-Ads Corporation

can aeronautic industry's best means of

9. Creating official and public interest in the use of aircraft for mail, commer-cial transportation and the transatlantic

10. Standardization of aeronautics.11. Solving the most difficult problems of the aeronautic movement as they arose. 12. Establishing airways and aerial

landing places across the continent, making airway maps, including the Wilson airway

13. Popularizing aeronautics by supply-

ing material for the press.

14. Pointing out how aircraft can be used or will affect different lines of human endeavor, so as to bring about the use of aircraft for different purposes and secure the support and active interest of the leaders of different movements, sciences and industries to the aeronautic movement.

Flying has been the only magazine in the world that has given at all times complete pen pictures of the different aspects of the aeronautic movement, its prospective development and possible application of aircraft for different purposes.

#### Gallaudet Aircraft Corporation Exhibit

The Gallaudet Aircraft Corporation will maintain headquarters at the show and exhibit models of their various types. One of the most unique will be E-L2 monoplane sport model. In this machine two stock "Indian" motorcycle engines are located in the nose of the fuselage, connected to a common transverse shaf

and resting on the top of the plane, and driving twin pusher propellers on longitudinal shafts driven by bevel gears.

Engines are "oversize" models, giving 20 H.P. each at 2400 R. P. M. Weight, 89 lbs. each. Propellers are 3 bladed (2 bloded propeller on exhibition), 4' 8" in 89 lbs. each. Propellers are 3 bladed (2 bladed propeller on exhibition), 4' 8" in diameter and 7' 0" in pitch. Propellers run at one-half engine speed, 1200 R. P. M.

The plane has a span of 33' 0" and a chord of 4' 6". Wing tip ailerons are 7' 0" long and 1' 0" wide. Wing section, modified R. A. F. No. 15. Diheral, 178°.

The body is of monocque construction.

The body is of monocque construction, 3-ply spruce being used. Two seats are provided, side by side, with single stick control.

Tail areas: Fin, 2 sq. ft.; rudder, 4; stabilizer, 12; elevators, 8.

Overall length of machine 18' 7". Special patented true streamplane wires brace the wings. For adjustment and dissem-bling a rod from one cabane to the other permits slackening of the cables and removal of planes without loss of adjustment. Turnbuckles are therefore unnecessary.

Eight gallons of fuel are carried; suf-

ficient for 2 hours.

With full load a speed of 40-80 M. P. H. is attained.

#### Goodvear Exhibit

Utilizing 4,000 sq. ft. located directly in front of the main entrance. Will present the smallest dirigible ever constructed in this country adapted to practical usage. The "Pony Blimp," as it is called, has a hydrogen capacity of only 35,350 cu. ft. The length is 95 ft., the diameter of the bag is 28 ft. and the little fuselage is equipped for the comfort of two passengers. This ship is equipped with rest. This ship is equipped with one 40 H.P. Ace Motor, having a maximum speed of forty miles per hour and a cruising radius of four hundred miles. A great deal of attention will be centered around the "Pony Blimp," not only because of its novel features, but by reason of the fact it may be put into many lines of practical service.

A portion of the Goodyear Exhibit will be devoted to enlightenment of the process of fabric construction. A light inspection table will enable the average layman to see and know the process of Goodyear fabric construction. Dirigible parts such as manifold scoops for balloonet inflation,



Auro Biplane of the type shown at the show by the Inter-Allied Aircra ft Corporation

valves for gas bags, display boards covered with the many hundreds of small accessories for the dirigible, streamline displays, fire-proof parachutes, finger patches for suspension of the fuselage, fabric water-proof flying suits with hel-mets and a line of nurse balloons will compose a part of their extensive lighter · than air demonstration.

The Goodyear Tire & Rubber Co., of Akron, Ohio, is the most extensive aerostatic exhibit of the show. The outstandstatic exhibit of the show. The outstanding feature of the booth is the dirigible pusher car, completely equipped, of a type which has many sisters in service. A 35,000 cubic foot type "R" military kite balloon is suspended and equipped complete. Attractive models of the twin enplete. Attractive models of the twin en-gine Navy dirigible and a trans-contimental passenger dirigible car are on dis-play. These models are complete in every detail, including full set of instrucontrols, lockers and up-

holstery. A balloon fabric complete testing labo-

A balloon fabric complete testing laboratory was on exhibition.

Several well-arranged panels of small parts, including rope, cable, cable clamps, thimbles, junctions, manometers and bridal rings gave visitors an idea of the numerous high grade parts that go into the construction of aerostatic craft. A panel of ropes, with various knots and ties, used by aerial "seamen," show that the art of the sailor of the sea applies to the sailor of the air as well.

the sailor of the air as well.

A full sized dirigible car equipped with dual control, indicating devices, including manometers, tachometers, air speed indicators, incidence and bank indicator, clock, driven by an 8-cylinder OX-2 Curtiss motor, of the type used on the FC training dirigible, having a cubic capacity of 85,000 feet, form an interesting part of the Goodyear exhibit. Models of "R" type kite balloon, military free balloons and of the U dirigible are also on display.

The Goodyear company is represented by Mr. E. R. Preston, manager of the government sales department, assisted by Mr. W. P. Seiberling, G. M. Kurtz, R. H. Upson and H. T. Kraft, whose names are familiar to all interested in aerostatics.

#### Hamilton Aero Manufacturing Company Exhibit

The Hamilton Aero Mfg. Company who has purchased the aircraft department of Matthews Bros. Mfg. Co., Milwaukee, Wis., will exhibit a complete line of their high grade mahogany propellers showing various designs suitable for all standard types of motors, aeroplanes, seaplanes and flying boats as well as other aircraft parts. Their exhibit will include propellers in various processes of manufacture, also showing how the aluminum leaf protective coating which water proofs the blades is applied.

Mr. Hamilton, who has been in charge of the aircraft department of Matthews Bros. Mfg. Co. since they have been building propellers, pontoons and other aircraft parts for the United States Government and prominent aeroplane manufacturers, will have charge of the exhibit and will demonstrate the various points of superi-

ority of Hamilton propellers.

#### Arthur Johnson Manufacturing Company Exhibit

The Arthur Johnson company is the pioneer aeronautic jewelry manufacturing company, and they will have on exhibi-tion some immensely interesting and excellently designed souvenirs, including propeller tie pins, watch fobs, military aviator's wings, brooches and rings.

#### John A. Roebling Sons Exhibit

The John A. Roebling Co., of Trenton, J., will exhibit a complete line of air wire, stranded cord, thimbles ferrules, as well as all types and kinds of wire products and insulated wire as it applies to the aircraft industry. The exhibit will be arranged in a series of glasscovered cases, each of which will contain complete data relative to the products contained in it.

A novel feature of the exhibit will be coil of wire possessing the highest tensile strength for any wire of its size and weight known in the world. It is 1/4" in diameter, 6x9 strand steel balloon cable, having a copper conductor in the center for telephonic communication. This wire is furnished to the United States govern-

ment for balloon mooring.

#### Floyd Smith Aerial Equipment Exhibit

The Floyd Smith Aerial Equipment Co. will exhibit an aerial life pack and

parachute.

This life pack and parachute and har-ess is the result of aeronautical and ness is the result of aeronautical and parachute experience dating throughout the past eight years, the last fifteen months of which has been devoted entirely to parachutes and life packs, including the testing of all the principle parachutes and packs from Europe as well as America. It has been developed well as America. It has been developed to fulfil the following requirements: Simplicity, adaptability, safety at speeds up to 300 M. P. H., light weight and compactness, to met any emergency that could possibly happen in the air.

The pack complete with harness weighs 15 lbs., 2½ of which is the harness.

The pack measures 24" long by 12"

wide by 3" thick. It can be used as a manually operated type or an extra length of cable (which is coiled inside the release ring on the wearer's breast), can be snapped to a wire or truss on the air-craft and will release the pack when the

It is not believed, however, that the latter method will be popular. The greatest innovation next to manual operation is that instead of relying upon some

means to pull the parachute from the pack, the pack is laid wide open, leaving the parachute free in the air.

The exhibit will include a typical section of a large passenger carrying fuselage with an entering ladder that will lage with an entering ladder that will swing down underneath, illustrating how this life pack can be used for passenger without the necessity of their jumping by their descending the ladder and releasing the pack, or one of the crew can release their pack and they will be removed without jumping or much loss of altitude.

#### U. S. Army Exhibit

In addition to exhibiting military aero-planes the War Department is featuring the recent developments of radio telephony as a part of their exhibit. Under the supervision of Lieutenants Woolfolk, Shangraw and Adams, visitors are per-mitted to "listen-in" while aeroplanes above are being directed by voice com-mand. It is thereby possible to hear the orders, just as the aviator in the plane hears them. An SCR-67 set is used for radio-telephone transmission and reception. Other sets on view are the SCR-57, an interphone for communication between aeroplane occupants; SCR-73, the 200 watt spark set, equipped with rotary gap, which was used for the direction of



Aerial Life Pack and Parachute of the Floyd Smith Aerial Equipment Co.

# LAWSON

Creator of Advanced Aircraft
There has never been a person hurt in a Lawson Airplane
Facts are better than fancies



THE first 26-passenger-carrying Lawson Air Liner passing over New York Harbor, as photographed by an accompanying airplane. This ship made a successful test flight trip from Milwaukee to New York and Washington and return — a distance of 2,500 miles, carried passengers all the way and broke almost every world's record for big ships.

All Lawson aircraft, whether commercial, military or sporting types, are planned, designed and built under the direction of Alfred W. Lawson, the well-known aeronautical expert, who has had 12 years of all round practical experience in aircraft work.

LAWSON TWO ENGINE 26-PASSENGER CARRIER
LAWSON THREE ENGINE 32-PASSENGER CARRIER
LAWSON TWO ENGINE MAIL CA—CARRIES 3,000 LBS. MAIL
LAWSON THREE ENGINE MAIL CAR—CARRIES 4,000 LBS. MAIL
LAWSON STEEL BATTLER—CARRIES 8 MACHINE GUNS

## LAWSON AIRPLANE COMPANY

Milwaukee, Wisconsin, U.S.A.

# SON

Creador de una Navegacion Aerea Avanzada. No ha habido nunca una persona lesionada en un aeroplano Lawson. Los hechos son mas poderosos y contundentes que toda fantasia.



🔻 L primer aeroplano de la linea Lawson conduciendo 26 pasajeros, pasando sobre el puerto de Nueva York. Esta foto grafia fué tomada desde otro aeroplano que lo acompañaba. Este aeroplano hizo un viaje espléndido desde Milwaukee a Nueva York y Washington, ida y vuelta, una distancia de 2500 millas. Llevó pasajeros durante todo el viaje y rompió casi todos los records establecidos en el mundo por buques aéreos de gran tamaño.

#### LINEAS AEREAS ESTABLECIDAS Y FUNCIONANDO

Todos los aeroplanos Lawson, tanto comerciales, y militares como de paseo "sport" son ideados, diseñados construidos bajo la direccion de Alfred W. Lawson, el bien conocido experto aeronáutico, que cuenta con mas de 12 años de práctica constante en la construcción de buques aéreos.

Lawson de dos máquinas, con capacidad para 26 pasajeros.

Lawson de tres máquinas, con capacidad para 32 pasajeros.

Lawson de dos máquinas para el correo con capacidad para 3000 libras de correspondencia y materia postal.

Lawson de tres máquinas para el correo—Capacidad 4000 libras de correspondencia y materia postal.

Lawson de guerra blindado—Lleva 8 ametralladoras.

## LAWSON AIRPLANE COMPANY

Milwaukee, Wisconsin, Estados Unidos de America

artillery fire with remarkable success; SCR-72, the two step amplifier, which increases a faint signal to one of extreme loudness; the SCR-81, a direction finding outfit, and numerous others.

On the balcony of the Garden, the Department of Military Aeronautics is exhibiting some remarkable photographic maps or "mosaics" which attracted general attention. There are also photographs showing the work of the military photographer, taking photographs, developing, printing, mounting in mosaics, and comparing them with other maps. A mosaic covering the territory between Fort Sill and Wichita on a scale of 10,000 to 1, having an area of over 35 square feet, is an interesting example of the work done by the military photographer.

#### U. S. Navy Exhibit The F-5-L Flying Boat

The F-5-L, constructed by the Naval Aircraft Factory at Philadelphia, has a span of 107 feet, wing chord of 8 feet, and an overall length of 50 feet.

Two 400 H.P. Liberty Engines are

used, connected to tractor propellers 10' 6" in diameter. 500 gallons of gasoline are carried, sufficient for a duration of 10 hours at full speed, near sea level, and a speed of 102 M.P.H. is maintained.

Fully loaded the machine weighs 14,000 1b. This weight includes a crew of 5 men; 1 Davis and 4 Lewis machine guns; 4,230 lb. bombs; radio apparatus; to phone system with 6 stations; carriggeons; and 500 gallons of gasoline. carrier

The machine is exhibited with one half covered and the other half exposed to show the interior construction.

In the making of this machine there are 6,000 distinct pieces of wood, 50,000 wood screws, 46,000 nails, braces and tacks, and 4,500 square feet of cotton fabric. hull requires 600 square feet of veneer. The 250 pieces of steel tubing total 1,000 feet in length. 5,000 feet of wire and cable, 500 turnbuckles, 1,500 each of bolts, nuts, and washers, and 1,000 metal fittings are necessary in the construction of this flying boat.

#### Navy M-2 Baby Seaplane

The M-2 Seaplane designed by the Navy Department and built by Grover Cleveland Loening, was to have been used for submarine patrol work. It is the smallest seaplane ever built, and its size has gained for it the name of "mole-It is easily set up and, occupying so little space, can be stored aboard a

The machine is a tractor monoplane with twin floats. The plane has a span of 19', a chord of 4', and a total wing area of only 72 square feet. The wing section is a modified R.A.F. 15. Overall length of machine 13'.

The floats are 10 feet long and weigh 16 lbs. each. They are constructed of sheet aluminum with welded seams interior of the floats is coated with glue and outside is not painted but coated with oil. Experiments have proven this practice to be most efficient in preventing corrosion. Mr. Loening's experiments have proven that paint applied to aluminum causes a corrosive galvanic action. Floats have exceptional reserve buoyancy; with machine at rest on the water it is impossible to overturn machine by standing on the wings near the tips or by standing on the rear of the fuselage.

The engine is a 3-cylinder Lawrence 60 H.P. air cooled engine, driving a 6' 6"

propeller with a 5' pitch. 12 gallons of propener with a 5' pitch. 12 gallons of gasoline and 1 gallon of oil are carried, sufficient for 2 hours' flight. Fully loaded with pilot and fuel the complete machine weighs but 500 pounds. The maximum speed is about 100 MP.H., and the low speed is 50 M.P.H.

#### Helium Filled Model Airship

The model dirigible exhibited by the Navy Department is inflated with Helium, which would have cost one million dollars a year ago, and which now can be produced for about \$100. It is through the wonderflu discovery of Helium that the dirigible balloon will make great development. Its cost is at present about 10 cents per cubic foot and later it will cost even less. The remarkable feature, however, is the fact that it is not infiammable, and therefore one of the greatest drawbacks of lighter-than-air craft is

Another item that is of interest is the fact that this model dirigible, 32' long and 7' in diameter, contains more Helium than has ever been placed in an envelope of any kind. In spite of the chemical process that makes it non-inflammable, Helium contains 85 per cent of the lifting power of Hydrogen.

The army and navy controls the entire sources of supply of this gas. Stations in Kansas and near Fort Worth, Texas, will soon produce about 2 million feet of Helium per month.

#### Astra-Torres Dirigible

The dirigible car shown by the Navy Department is from a ship of the "Astra-Torres" type. The airship was built by the French in 1916 and turned over to the Americans in March, 1918, at Paimboeuf, France, the American Naval Station commanded by Commander L. H. Marfield, U.S.N. It was used until November, for coast patrol on the west coast of France.

The car is 45 feet long, 6 feet wide and 7 feet high. The envelope (which is not exhibited) is 221 feet long and 47 feet in diameter, having a capacity of 252,000 cubic feet. Speed, 45.5 miles per hour. With a crew of Americans, this ship has stayed aloft for 25 hours 40 minutes. At its cruising speed of 45.5 miles, the endurance is 10 hours.

The car accommodates a crew of 12. At the front, the pilot controls the side-to-side movements of the ship. Behind him is the bridge, from which the alti-tude and trim are controlled by a pilot, and the engines controlled by the Com-manding Officer. Upon the bridge are numerous instruments for navigation. Below and aft of the bridge is the chart room, about 6 feet square, also used as a dining room. Next is the blower motors and blowers for maintaining the pressure and trim of the envelope.

A passageway runs through the center of the car, and four fuel tanks and two water ballast tanks are located at either side. Aft of the tanks are the bomb racks, holding four 150-lb. bombs, and at the stern is the radio room. Two 150 H.P. Renault engines with two-bladed tractor are stallers are side. tractor propellers are used. placed on outriggers. Two used. They are Two Lewis machine guns are carried.

This ship is one of several large dirigibles purchased by the United States Navy and brought to this country for the purpose of development.

#### The Sky-Ads Corporation Exhibits

The Sky-Ads Corporation which has been organized to sell and deliver an original form of aerial advertising, will be represented at the Show by Mr. Maurice Wetzel, who was formerly in the Army Air Service, and has conducted aerial experiments for years prior to the war. Ensign Hull, late of the U. S. N. R. F., is the chief pilot for the company.

The "Sky-Ads" are huge inflatable silk images, replicas or facsimiles of manutactured products, greatly enlarged but faithfully reproduced as to shape, colors, design and wording that are dropped from aircarft for advertising purposes. They range in size from fifty feet down to about five feet according to the application, and although they are extremely large and visible from a great distance, they are constructed of so light a material that they may be scientifically folded into an extremely small compass and weigh but a few ounces. Dozens may be carried in the cockpit and the pilot can drop them with one hand. They open immediately and slowly float to earth where they seldom escape hundreds of anxious uplifted hands. The exhibit at the Chicago Aero Show, January eight to fifteen inclusive in space sixteen, Accessory Section, will include several samples: an enlarged can of Old Dutch Cleanser, a huge bottle of Bevo, a fifteen-foot copy of the famous Heinz 57 pickle, an enormous package of Omar cigarettes, etc. The Sky-Ads Corp., through their organization representative, Mr. Maurice S. Wetzel, have contracts with seven of the world's largest advertised. tisers for work during 1920.

The landing flares are to be made in three kinds for night flying for private owners, aerial transportation companies, landing fields, flying schools, etc. They operate from the ship, from the ground, and in the air.

Message and name 'chutes for dropping mail, messages, parcels, maps, etc., for all pilots and passengers.

Parachutes with allied and U. S. flags attached, made of same light material, useful for exhibition aviators to drop from

#### Aerial Fire Patrol

The aeroplane forest fire patrol conducted in the National Forests in California by the Army Air Service in co-operation with the Forest Service of the United States Department of Agriculture has been extended to cover a portion of the forests in Oregon. Headquarters have been established at Salem, Ore., and the operating squadron for the present will consist of five officers and seven enlisted men operating eight aeroplanes. The City of Portland has donated a landing field and will construct a hangar. Patrol routes in the Oregon and Santiam Forests are now being worked out.

One of the Army aviators in the fire patrol work recently made a successful flight to the floor of the Yosemite Valley. To make a landing the aviator had to gain an altitude of 11,000 feet and spiral down between the walls of the canyon, down between the walls of the canyon, which are 5,000 feet high and a quarter of a mile apart. The landing was difficult because of high trees and wires. This exploit was of much interest to forest officers, as it is thought to have been a step toward the more extended use of aeroplanes in the forests, where landing places in the mountains are comparatively few tively few.

## MACHINE-MADE CABLE TERMINAL CONNECTIONS

At about the time of the signing of the armistice, there was placed under test at McCook Field a wire wrapping machine designed and manufactured by the Edstrom Machinery Company of Chicago, which was so successful that, had the pressure of war production been maintained, it would certainly have been rapidly introduced into the factories of the large aircraft manufacturers. Not only were the wraps made by this machine perfectly uniform and much stronger than those turned out by the most skilled hand wrappers, but were turned out at many times the speed of hard wraps.

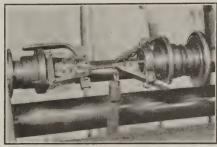
The first operation in making the cable terminal is to form the loop. For this purpose there is a special bending fixture attached to the rear of the machine. is partly visible at the extreme left end of the photograph. The cable is placed between pins, one of which is mounted on a swinging lever. By a quick movement of the lawer the cable is the lawer the cable is the lawer the swinging lever. ment of the lever, the cable is bent to the proper form. Two turns of soft wire are twisted about the end of the loop to hold it together. These are automatically ejected when the wrap is nearly com-

After the loop is formed in the end of the cable, the thimble is inserted and the end of the cable is gripped firmly in the jaws of the machine The rest of the jaws of the machine cable extends through the rear center and the long tube on the right. The serving wire is led from a spool mounted on the underside of the machine around a drum and through the serving guide. By adjustment the wire can be wrapped at any desired tension. The fitting, whether shackle or turnbuckle, can be accommodated in the head of the machine for permanent attachment to the terminal.

The machine is driven by a motor attached to the base. The head and tail centers are geared together and through simultaneously. The tail center and feeding guide travel laterally at a sufficient speed to wind the wire as close as desired. Spacing is automatically made for soldering at about every inch of wrap.

Official reports of tests made at McCook Field give indication of the great strength of the machine-made wrap. After giving details of numerous tests, the reports state that the results of these tests con-clusively show the advantages to be obtained by the use of a machine for wrapping the serving wire, both as to the increased speed with which the operation can be performed and the strength of the

wrap but unsoldered terminal. The stronger the unsoldered terminal, the less is the necessary dependence upon the strength of the solder. In a tensile strength test of ten unsoldered points ranging from 1/8 to 5/32" in diameter, only one failed at a



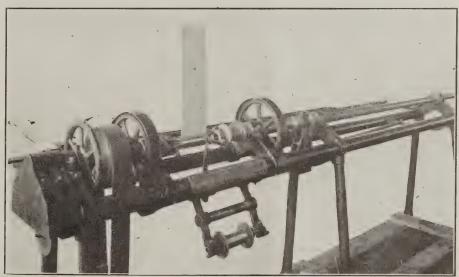
Close view of the chuck of the Edstrom machine

load below the rated capacity of the cable. The 3/16" specimens served with copper wire failed at loads averaging 71 per cent. of the full strength of the cable. A test of some 3/16" unsoldered hand wound terminals made by several of the highest skilled wrappers of the largest American aircraft manufacturers showed an average of 35 per cent. of the cable strength. Other specimens from the same manufacturers, but machine wound showed an

average strength of 52 per cent.
Where cable terminals are required in quantity, it will be seen from the following figures compiled by the government engineers, that the machine-wound terminals permit of rapid production. By the hand method ½-inch terminals can be completely finished at the rate of about 12 to 15 per hour, 3/16 terminals at the rate of about 9 to 11 per hour. By using the machine for wrapping the rate is easily 30 per hour for the ½ to 3/16 sizes.

The advantages in using a machine for wrapping cable terminates are well established, both in view of the fact that tighter and therefore a safer wrap is the result, and because a large saving of time is possible. The Edstrom machine is rigidly and economically constructed, and requires very moderately skilled labor to operate.

One western manufacturer who has used this machine in his plant states that the machine freed from twelve to fifteen men, and produced wraps of great strength and uniformity. Prior to the adoption of the machine the hand-made wraps were a source of all kinds of trouble—delays in production of planes resulted from slowness of hand wrapping, and re-wrapping was sometimes necessary to secure uniform and satisfactory results. The Edstrom machine, however, removed all trouble from that source.



The Edstrom Wire Wrapping Machine which makes a wrap of much greater strength and neatness than a hand wrap

#### Wild Duck Not Unduly Disturbed by Aeroplanes

Sportsmen and others interested in wild fowl, particularly wild duck, are unduly exercised and alarmed in regard to wild fowl being disturbed by aeroplanes. Lt. Col. H. M. Hickam, while he was in command for several months at Dorr and Carlstrom Fields, flew regularly at least twice a day over a swamp where wild duck of several different descriptions used. In order to flush these duck, Col. Hickam found it necessary to fly within 50 or 100 feet of the water, and on flushing them they immediately flew down and landed in approximately the same place, notwithstanding the fact that there was an abundance of water within three or four miles where they might have gone.

As an instance of the effect of aeroplanes on wild duck, he attempted on several occasions to herd a flock of Teal numbering about 500 over a blind. He chased this flock of duck for approximately half an hour without being able to get them over the blind, and without

driving them away from a bend in a long slough. Finally, he landed about half a mile away, and on his way back to the blind, these duck flew over him and he fired one shot at them, whereupon the whole bunch left and flew about 15 miles away. This same incident was repeated on several different occasions.

In view of the past experiences of Colonel Hickam it may be stated that wild duck are not disturbed unduly by any number of aeroplanes. An aeroplane which flies over 1,000 feet above the water will not flush duck or other wild fowl.

## MODERN WING COVERINGS—MATERIALS USED AND THEIR APPLICATION

By R. G. DORT, A.M.

Lacing or Quilting

(Concluded from page 418)

Lacing (quilting) should be done with the heavy lacing cord described previously. A steel needle of a length suitable to the thickness of the wing under consideration should be used. Lacing should be begun at a distance of 2.25 inches from the leading edge in the slipstream areas and at a distance of four inches from the leading edge elsewhere on the wing. In the slipstream the lacing should be at 2.25-inch intervals. This is very important owing to the greater tendency to vibration in the area directly affected by the propeller blast. Elsewhere on the wing the lacing should be at four-inch intervals.

At the first point of lacing, the cord should be secured with a slip knot and two half hitches. The lacing cord at each point should be passed through the cover, down one side of the rib, through the cloth at the other side, over the reinforcing tape, through the cloth again on this second side of the wing, back across the other side of the rib, through the cloth on the back across the other side of the rib, through the cloth on the first side and knotted. At all points except the first a square knot should be used. A simple half hitch at each lacing point is not sufficient. In the event of the breaking of the lacing cord, a half hitch holds the possibility of the lacing cord loosening along the whole rib. The ties should be drawn as tightly as possible. The cord is carried from lacing point always on the same side of the wing. The lacing cord at the last point should be knotted as the first lacing point

last point should be knotted as the first lacing point.

A wing being laced should be in the upright position with a man on either side—one to push the needle through initially and to receive and tie the knot on its return, the other to and to receive and tie the knot on its return, the other to receive the needle on the reverse side and to push it through to the first workman. It is advantageous to make the holes through which the needle and lacing cord are to pass with an awl before the lacing is commenced. This insures accurate spacing and there is less likelihood of difficulty in passing the needle from surface to surface. These holes are conveniently made with the aid of an aluminum strip with holes punched at the proper intervals and the width of the cap strip apart.

The so-called French method of lacing deserves a word. (It has been said that this is the method the Italians use, as well.) When this method is used the lacing cord does not

(It has been said that this is the method the Italians use, as well.) When this method is used the lacing cord does not pass over the caß strip area at all. The rib is laced down each side and through the reinforcing tape. It is obvious that the standard reinforcing tape with no strength in the direction across the rib (when applied) is entirely unsuitable for this method. A reinforcing tape with strength equal to that in the warp of the standard tape in both warp and filling must be used. This method has been used in at least one factory in this country. It is not recommended. Lacing across the ribs is considered far superior as a safety, with no advantages of this country. It is not recommended. Lacing across the ribs is considered far superior as a safety, with no advantages of manipulation to make the method just described more desirable. As has been mentioned under "Materials", lacing cord should be waxed with pure beeswax. No trouble with the bubbling or blistering of dope over the stitches will be encountered when *pure* beeswax is used.

The application of finishing tape is essentially a doping process. It will be discussed under "Dope Application".

The relative humidity of the fabric application and cutting

The relative humidity of the fabric application and cutting rooms should be within five per cent of that of the doping rooms. Wings with the undoped covers thereon should not be exposed to very different humidity conditions in their passage from the fabric application rooms to the dope application rooms. The reason for both these precautions is that any large change in humidity conditions varies the initial tension of the cloth before it is, so to speak, "fixed" by the dope.

#### Application of Dope and Pigmented Protective Coverings

Of general excellence are the direction for the application of dope and pigmented protective coverings contained in U. S. Air Service Specification 24,100-H. Properly followed, they will give good results. A few changes will be suggested as advantageous as doping procedure is discussed below.

To avoid blushing and to preserve nearly constant initial cloth tautness, the relative humidity of the doping rooms must

be kept near a certain point. As has been noted under the discussion of acetate dope, the question of blushing is not serious when a dope with a large amount of high boilers—such as the U. S. Standard No. 5—is used. But in the case of the simpler acetate dopes and to insure practically uniform tautness in the finished wings, a carefully regulated humidity is necessary.

The humidity need not be so carefully controlled that any complicated and expensive apparatus has to be installed. Some care as to the source from which the air is taken, coupled with means of heating, will be sufficient in the normal North American climate. Air for the dope room should, preferably, be drawn from the fabric application room, where some projectives has already been taken from it by the cloth as it is moisture has already been taken from it by the cloth as it is being cut, sewn and applied. The temperature of the dope room may be somewhat higher than that of the fabric application room, thus lowering the relative humidity. Recording psychrometers should be hung in both the dope and fabric rooms. If either room is very large two should be used. Together with proper thermometers, this will enable close watch to be kept on humidity conditions. The result will amply pay for the trouble taken, in that wings will be produced without the troubles incident to blushing with tourtees which the troubles incident to blushing with tautness which can be guaranteed as uniform

The relative humidity of the dope rooms is required to be less than fifty per cent by the Air Service Specifications in this country. In very wet weather this may require a temperature too hot to work in comfortably. In this contingency a "doping over" is very convenient. Another disadvantage which has been claimed for too high a temperature in a dope room is the lowering of the viscosity of the dope; thus the amount applied per coat of film-formign material is reduced. With the dopes and temperatures commonly found in this country, this objection need not be heeded. Ordinarily the temperature of the dope rooms ought not to drop below 70 degrees Fahrenheit or get much above 85 degrees Fahrenheit.

Ventilation in the dope room is of prime importance, not only because of its importance in controlling humidity, but from consideration of the health of the workmen. No dope at present used in this country is poisonous per se. It should be carefully noted that any dope containing as a solvent tetrachlorethane has distinctly toxic effect. Notwithstanding the non-toxic action of the fumes of dopes in current use, good ventilation must be maintained. Otherwise drowsiness and headaches will greatly cut down the work of the dope room hands. The fumes of nitrate dope and the pigmented protective coverings now adopted—especially when applied by spray—are particularly noticeable in this action.

The British require that the air of the doping shed be changed thirty times an hour. This is excessive. A change of from fifteen to twenty times an hour is probably sufficient.

In any case good ventilation should be maintained. Ideally In any case good ventilation should be maintained. Ideally the air for the doping rooms should be driven positively by fans into the doping shed. This air should be drawn from the fabric application rooms and slightly heated as it enters the dope room. Preferably it should enter the dope room at the top and be drawn off through floor ducts uniformly distributed over the work room. It is considered bad practice to use motor-driven exhaust fans to draw air from the dope rooms. Such practice is a distinct fire hazard. Explosive mixtures might be easily formed from the dope vapors; the possibility of ignition by sparking of the motor is not remote possibility of ignition by sparking of the motor is not remote. In this case the speed at which the fumes were being removed would not be, obviously, the equal of the speed of the propagation of combustion—and serious results would occur. Smoking or flames of any kind must be rigorously prohibited in dope rooms.

It is advisable that dope workers be allowed a fifteen-minute recess in the morning work period and a like time in the fternoon. They should be obliged to spend this time in fresh-preferably open—air. The time lost will be more than made up by increased speed and attention to work.

#### Application of Dope

In England the finishing tape is generally applied before the first coat of dope. In this country one coat of dope is generally applied before the finishing tape is stuck on. There

selectary applied before the finishing tape is stuck on. There is little to choose between the two methods.

All coats of dope are applied by brush of suitable size. Spraying of acetate dope is not practical, and has not been successful. The wing may be laid horizontal for doping or held upright in a suitable frame. Vertical doping is necessary

for large size wings when the chord of the wing is greater than twice the easy average reach of a man. It is in general a better method, as there is less tendency to dope too heavily the first coat.

The first coat of dope should be considered a sizing coat. It should be laid on lightly with a brush from which all excess of dope has been removed by drawing each side over the edge of the dope can. No effort should be made to make this coat "strike through". This is a particularly necessary precaution when cotton is being used. Striking through of the first coat of dope will, in varying degrees (in which the amount of dope which has penetrated and the possible formation of a film on the back of the cloth enter as factors), very much reduce the tearing strength of the completed wing covering, although the tensile strength is not affected in any negative way.

#### Application of Finishing Tape

After the first coat of dope is dry, the finishing tape may be applied. As noted above, this may be done equaly well before any dope is on the cover. Fresh dope should be laid along the line of the wing ribs over the lacing stitches. On this the finishing tape referred to elsewhere under "Materials" is laid under light tension and doped down with the brush. The tape should be brought around the leading edge and around the trailing edge to the point where the application was commenced. The frayed or pinked edges may be smoothed down with a brush or by the fingers. A dope of slightly higher viscosity has been suggested for this operation. Furnishing a special dope for this purpose is not worth while. Letting a small amount of ordinary dope evaporate for such a length of time until it is of the desired consistency will provide a medium which will be useful for the purpose.

Leading edge, wing tip, and trailing edge are covered with finishing tape in a similar manner.

#### Application of Balance of Dope Coats

The second coat of dope is applied after the finishing tape is thoroughly dry. It is axiomatic in the doping game that one coat or application of dope must be thoroughly dry before another is laid on. Under ordinary conditions of temperature this would be the case in thirty minutes at the most. It may be hastened by the use of dope ovens. (See below.)

This second coat of dope should be applied more heavily than the first, but yet not with a full brush.

The third and fourth coats are applied with a full brush and with no special care as to the amount laid on. A fifth coat may be applied if the tautness does not seem to be sufficient. It is to be noted here again that with dope containing high boilers in considerable quantities maximum tautness will not be reached for six to twelve hours. This should be taken into consideration when the question of a fifth coat of dope comes up. The number of coats of dope and the weight of dope film left on the wing are not matters for especial concern when they are within reasonable limits. Proper final wing tautness is of more importance. For the sake of economy, however, the number of coats of dope and weight applied should be kept as low as possible. Five coats of the current acetate dopes are ample to give the required rigidity of wing covering, when the cloth has been applied at proper tension. A maximum dope film weight of 3.5 ounces per square yard ought to cover any contingency of slackness.

#### Dope Cans

Acetate dope, being very expensive, should not be wasted. Open dope cans are a prolific source of waste. Cans of a closed type, some so made that the brush can be dipped only so far—thus in a measure preventing the waste of dope by smearing on the brush handles—are on the market. Their use should be insisted on. If open cans have to be used the workmen should be allowed only enough dope for fifteen minutes' job, at the end of which time they should be required to refill. If dope is left standing open to free evaporation much longer than a quarter of an hour viscosity may be so changed that the result of the doping operation becomes unsatisfactory.

#### Doping Ovens

Doping ovens have been used both here and in England with considerable success. Their usefulness lies in the speeding of the drying of the wing and in preventing blushing under conditions of extreme humidity. In quantity production the use of a doping oven at a temperature of from 95 to 115 degrees Fahrenheit with proper ventilation will reduce materially the time of a production of a finished wing. At a temperature of about 110 degrees Fahrenheit the time of drying between coats may be reduced to seven or eight minutes. On

days when the humidity is very high the ovens will be found useful to dry wings without the deposition of moisture and resultant "blushing". In a properly run dope room, where humidity conditions are fairly well regulated, the use of a dope oven will pay only at rare intervals unless a very large proportion is being undertaken. In that case the extra speed and certainty of operation regardless of how high the humidity may be, naturally will be worth while.

#### Final Tautness

No method wholly satisfactory for plant application has been yet devised for the even comparative measurement of wing tautness or rigidity. A tautness meter devised in England works admirably in the laboratory and has provided many interesting sets of data. Another British made meter has been used in plants there. The best development to date appears to be a tautness meter devised by Mr. F. R. McGowan of the Bureau of Standards. When sufficient calibration data has been secured, together with results which will indicate the necessary conditions for its use, this instrument ought to be of considerable benefit in checking the final tautness of wing covers. At present the entirely unsatisfactory method of tapping is the only one by which to judge. Not only does the personal equation enter largely, but measured results seem to indicate that a "high drum note" does not always indicate tautness superior to that of a similar surface emitting a lower note. All that can be said is that the wings must be very taut to the feel of an experienced observer. Pressure of the finger should not cause an indentation which remains over twenty minutes to a half hour.

#### Application of Pigmented Protective Coverings

The pigmented protective coverings should not be applied until the last coat of dope is thoroughly dry. When the doping procedure had been so perfected that proper tautness is assured, it is not necessary to wait the six to twelve hours for the wing covering to attain maximum tautness through the effect of the dope. Until the operation is so perfected that it is certain enough dope has been applied, the application of the pigmented covering should be delayed until maximum tautness is assured.

Either type of pigmented covering may be applied by spray or by brush. The former method is preferable, both from the point of view of time consumed and excellence of product.

If a pigmented oil varnish is used, one coat by brush or spray should be sufficient. If the covering powers of the enamel be poor, it may be necessary to apply two coats if it be done by brush. One coat applied by spray is practically always enough.

The drying time allowed between coats of enamel and after the final coat before plane assembly should be at least twelve hours. If oven drying of the dope has been used the wing should be given time to cool thoroughly before application of the enamel. Otherwise "crawling" of the enamel is likely to occur.

If a pigmented protective covering of the pigmented dopes type is used—and this is strongly recommended in place of an enamel—the time of drying between coats and to handling for assembly may be reduced to about thirty minutes. With two makes of covering of this type it is essential that the second coat may be applied within thirty minutes of the application of the first type. In other words, the second coat must be applied before the first is bone dry. If this is not done, the second coat acts as a remover of the first and a very poor job results. The best type of pigmented covering of the dopes type manufactured in this country has not this disadvantage.

If applied by spray, one coat of pigmented covering of the dopes type is sufficient. If applied by brush, two coats will be necessary. In applying this medium by brush, the covering must be put in both coats with a very full brush—flowed on—rather than brushed out. After the wing is thoroughly dry there will be found sometimes, when this covering has been sprayed on, a dust of pigment on the surface. Gentle brushing with a soft kitchen brush will remedy this.

#### Insignia

In the application of the pigmented covering an area the size of the insignia should be left. If an enamel has been used as pigmented covering, the insignia should be painted on in the same medium. The same holds true with a covering of the dopes type. Stencils and a spray are convenient in either case.

Much trouble has been experienced with the peeling of the insignia colors when put on in an enamel medium. This has not been the result when the dope media for the insignia colors have been used.

## ELECTRICALLY HEATED AVIATOR'S CLOTHING

As the art of flying develops it is reasonable to suppose that electrically heated clothing will become standard equipment for most aeroplanes. No matter how the mechanical and aerodynamical problems are solved and the aeroplane perfected, there will always be need for protecting the aviator and his passengers from the extreme cold which exists at high elitings.

exists at high altitudes.

The standard electrically heated suit as supplied to the United States Government includes a rubberized moleskin coat United States Government includes a rubberized moleskin coat lined with lamb's wool, an electrically heated helmet-lining of silk jersey, and similar linings for moccasins and gloves. The suit is not heated, as it has been found necessary to protect only the extremities. Over the helmet lining the aviator straps his leather helmet; over the electrically heated gloves he places his leather gauntlets, while his feet are protected by whatever kind of moccasin he prefers, worn over the electrically heated socks trically heated socks.

To heat the suit the plane is equipped with an air-driven generator, fitted with a small propeller, which insures current even should the engine fail to function. At a convenient point

in each suit is a miniature switch by means of which the flyer can control the heat in any part of his outfit.

A complete outfit of electrically heated aviator's clothing, as specified by the Bureau of Aircraft Production, consists of a wired harness assembled in a one-piece suit, and electrically heated garments as follows: One helmet, one pair of mocasins and one pair of gloves. casins, and one pair of gloves.

#### Garments

Each electrically heated garment consists of an inner and an outer shell of Denier Jap Filature silk. The heating element, mounted on a cotton cloth backer, is enclosed between the aforesaid outer and inner cases. The backer containing the heating unit is securely sewed to the inner lining of each garment, with the resistance wire adjacent to the outer lining. All edges are securely sewed in such a manner as to prevent any possibility of raveling.

The silk used in the helmet, gloves and moccasins is 13/15 Denier Jap Filature silk, of the best grade No. 1. It is woven on a 28-gauge Milanese loom, throw 3-thread 8 turns to the inch. The quality is 4" to the rack. The finished silk has a stretch of at least 100% and contains no loading of any description other than the highest quality of gelatine. The percentage of gelatine in no case exceeds 4%. The heating elements are ductile, flexible and elastic.

The material of which the element is made includes a current-carrying member of a comparatively low restirity to in-

rent-carrying member of a comparatively low restivity to insure liberal heat-dissipating surface. It is of such design to preclude the development of short circuits and is capable of resisting with a large factor of safety such mechanical abuse as it is likely to be subjected to in the service. The unit is such that it will not be injured by being wet, though it will not be operated when saturated.

The heating elements consist of a thin, flat braid of approximately nine strands of No. 35 to 37 B & S double silk-covered resistance wire. The braid is approximately 3%" wide and is securely stitched along both edges to a substantial cotton cloth backing. The unit leads are anchored to the cotton backing, so as to prevent a strain in the leads being transmitted to the resistant wire.

The heating element is capable of continuous operation at 33½% over voltage, without injury. It conforms to the heat distribution as mentioned for the separate articles.

The elements have the following capacities under working temperature at 12 volts: Helmet, 1.2 amperes—14.4 watts; gloves (each), 1.4 amperes—16.8 watts; socks (each), 1.4 amperes—16.8 watts.

Total current for suit, 6.8 amperes. Total wattage at 12 volts, 81.6 watts. Current does not exceed .05 amperes plus or

minus in each element.

The electrically heated gloves consist of an inner and outer silk glove, the heating unit being inserted between the inner and outer gloves. The inner gloves are of various sizes as desired.

Gloves are made of Denier Jap Filature silk. They are sewn in seams without silking on the back. They are seamed with silk throughout and made with fourchettes and double-tipped fingers and thumbs. The thumbs are sewn into the

gloves with two rows of stitching.

The gloves are flexible in all directions, neat in appearance, and comfortable. They are provided with an attaching cord

and terminal connectors.

The heating elements are attached to the gloves at the back

of the hand and the back of each finger and thumb up to the base of the nails. They are so placed that they will distribute their heat uniformly over the back of the hand and fingers without interfering with the operator's sense of touch. The heating element in each glove is of such length as to absorb 16.8 watts. The conductors are securely stitched in position and each glove is wired so that there will be a minimum security difference between editional difference difference between editional difference difference difference difference difference difference difference difference difference potential difference between adjacent slopes.

Care is taken to insure that the gloves are thin enough to allow their being worn as a lining in other gloves, and are constructed so that the knuckles will not be chafed when the

hand is bent.

Each glove is provided with a circular elastic grip at the wrist. In each lot of a dozen pairs of gloves supplied by the Government, the sizes ordered are as follows: Three pairs No. 8; five pairs No. 9; and four pairs No. 10.



Aviator's suit, showing connections and cables for electrically heating the helmet, gloves, and moccasins

The moccasins are made of silk as used for gloves. are neat in appearance and comfortable to wear. They measure not less than six inches high at the back of the heel Each moccasin is provided with an attaching cord with terminal connections.

The heating unit is inserted between the inner and outer fabric. It distributes the heat around the sides of the foot, near

the sole, over the toes and round the ankle, the principal distribution of the heat being around the sides of the feet.

The moccasin sizes on a basis of one dozen pairs and gauged according to standard sock sizes are as follows: Five pairs size 11½; six pairs size 12; and one pair size 12½.

The helmet consists of an outer and inner shell of silk. It is made to fit neatly over the head. The quality weave and weight of the silk is similar to that used for the gloves.

From top to bottom the helmet measures not less than 13 inches at the back and not less than 16 inches at the front. An opening is provided to expose the eyes, nose and mouth. The opening is provided to expose the eyes, nose and mouth. The helmet in no way interferes with the sidewise vision of the Round holes 11/2 inches in diameter are provided for ears.

Each helmet is provided with an attaching cord with ter-

minal connectors.

The heating element is placed between the inner lining and the outer shell. It distributes the heat in the zone across the

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forehead, just above the eyes, down each cheek, over the chin, around each ear and across the back of the neck.

#### Conductors

Each helmet, glove and moccasin is provided with a flexible lead provided with a terminal having a pair of male connectors. Terminals of heating elements are soldered to leading-in wires, which are No. 18 B & S flexible cable insulated with double wrap of impregnated silk and one braid.

#### Connectors

The terminal at the left front of the suit for the helmet, at the end of each sleeve for the gloves and at the bottom of each leg for the moccasins, is a substantial approved construction to withstand rough usage in service and of a type that does not permit short circuiting in the terminal.

that does not permit short circuiting in the terminal.

Connectors of the Carr fastener type are provided to connect the garment to the wiring in the suit. The connectors are mounted in pairs and all pairs have the same distance between centers. All fasteners in each garment are of the same size and design and of a type which insures positive electrical connections.

Provision is made to insure against any strain between the wire and its attached snap when the terminals are disconnected. This is accomplished by the use of a stout terminal piece whereupon the snap fasteners are mounted. Its design is such as to permit of its being grasped by the wearer in order to connect or disconnect the unit.

The female parts of the connectors are mounted in a substantial leather base secured to a cloth backer which is securely attached to the suit. They are connected to the wires of the harness, bringing the ends of the conductor between the outer surface of the leather base and the washer of the

fastener when same is riveted together.

The male part of the fasteners is assembled in a piece of heavy khaki-colored cloth, folded so as to form a piece of four thicknesses; the connectors are assembled so as to leave a finger grip at the end. They have the same distance between centers as the female fasteners. The connectors are attached to the garment leads by including the conductor under the washer of the connectors when they are riveted in place.

#### Wire Harness

The manufacturer of the heating elements furnishes the necessary harness to be inserted between the outer fabric and the lining of the aviator's suit to carry the electric current to the various elements. The harness may be installed in the



An electrically heated glove and moccasin. Heat in the glove is distributed uniformly over the back of the hand and fingers. In the mocassin, heat is distributed around sides of foot, near the sole, over the toes, and around the ankle



The electrically heated helmet distributes heat across the forehead, just above the eyes, down ach cheek, over the chin, around each ear, and across the back of the neck

suits by the manufacturer of the heating elements. All heating units are connected in parallel and not in series.

The wires are No. 18 stranded copper twin conductors well insulated but flexible. They are joined at the center of the back just below the wearer's neck, from which point one is carried directly down to the right leg and terminates in a connector located within the trouser leg approximately one inch from the bottom and on the outer side. Another pair of wires are carried down on the left leg and terminate in a similar manner. Other pairs of wires are carried down each sleeve and terminate in connectors at the wrist below the fur lining. Another pair of wires are carried over the left shoulder and terminate in a pair of connectors located on the outside of the left front, 1½" to the right of space between third and fourth button from the top. The connectors are therefore covered by the right front of the suit when same is closed. Sufficient slack is allowed in all wires so that they are not strained by the movements of the aviator. The wires are encased in a substantial cloth tubing, a ¼" selvage is allowed on each side of the wire to be used in attaching the wires to the clothing.

At junction point of the five pairs of wires they are carefully connected in multiple by a soldered connection to a No. 16 double conductor N. E. C. standard (1/32" rubber) flexible braided cord, with double black braid over all without weather-proofing, which is brought out of the garment at the right-hand side.

No joints exist in the connecting wires between the junction point and the terminal.

#### Installation of Harness

The wire harness is assembled in the suit between the outer shell and the lining, and is sewed to the outer shell by stitching along both edges for which ¼ inch selvage is allowed. The harness is securely anchored to the suit at the points where the connectors are located, thus relieving all strain on the terminals when disconnecting the clothing from the harness. All connectors are firmly attached to the suit so as to prevent the strain on same from being transmitted to the wires

The cable is brought out of the suit at the right side, one inch above the belt, and anchored at that point in such a manner as to prevent a strain on the cable ripping the cloth, A double pole slip connection is inserted six inches from suit where cable enters clothing. The male end is attached to suit. The cable measures  $4\frac{1}{2}$  feet from female end of double pole slip connection

The accompanying illustrations were supplied by the Edison Electric Appliance Company, which has the distinction of having developed for the United States Army and Navy much of the standard aviator's heating equipment now in use.

## AEROPLANE ENGINE INSPECTION

A EROPLANE engine inspection may be conveniently divided under four headings, as follows:

1—Parts Inspection 2—Assembly Inspection 3—Inspection on Test 4—Overhaul Inspection

In parts inspection each individual part is inspected separately. Under the name of each part is given a list of important dimensions and other features to be checked up. An inspection of any part under this heading should show whether its further consideration in the assembly is warranted.

show whether its further consideration in the assembly is warranted.

It will be noticed that in the parts inspection in a good many cases a number of considerations are omitted to allow for a complete detail inspection. This is based on the writer's experience with aeroplane engines.

It was very often found that in carrying out a complete detailed inspection on parts, a great many times such parts would fail to pass. On the other hand, in assembling on the engine the same parts which were otherwise rejected would bear the proper relationship with other parts. Therefore, in most cases, to carry out a complete detail inspection on the individual parts, such as camshafts, crankshafts, gears, etc., might give rise to excessive rejection of such parts which, when assembled, would prove serviceable.

For this reason, the writer has included all these details under the second heading and discussed them in connection with the assembly. The advantage of this method of procedure from the points of view of production and salvage is evident. No comment is called for by headings 3 and 4.

#### 1-Parts Inspection-Camshaft

1—Parts Inspection—Camshaft

1—A general survey by sounding the entire case is very advisable. This will give an idea as to the grade of castings as a whole and indicate the existence of cracks or welds.

2—Make a careful scrutiny of the inside of the case and note the degree of porosity, especially in the various webs and bosses, paying particular attention to the presence of welds, checks or cracks. The main bearings and bosses should be examined very closely, as very often they are split when studs are set in.

3—Examine gear case for cracks or welds where the magneto base fastens on. See that hole for magneto drive is not bored oversize. Try all tap holes in gear case face with plug gage for oversize.

4—All camshaft bearing must be machined

Try all tap holes in gear case face with plug gage for oversize.

4—All camshaft bearing must be machined according to drawings. Proparticular attentention to the stock under the front camshaft bearing, as the greatest stees due to whipping and vibration occurs at this point (propeller end). Carefully observe the holes drilled for camshaft retaining scraws and see that they are not oversize or riugged.

5—Examine deck of upper half of crankcase and, in the case of V type motors, closely watch apex, noting possible cracks, checks or degree of porosity, welds, etc. Note carefully the amount of stock at breather pipe stude and make sure that it is sufficient. Insufficient stock at this point might cause a weakening of surrounding material where stude are set in place. Above all, note that the decks are of equal thickness.

The case should be properly faced for cam

The case should be properly faced for cam follower guides. Cam follower guide holes and cylinder holes should be chamfered. This is to allow these assembled parts to lie flush. Removing all feather edges will also improve resistance of material at the above points.

Allow no defective metal, plugs or welds in the walls between the cylinder decks and the case flanges; also be sure that all engine tiedown lugs are of substantial material, not tolerating defective material of any description, as all stresses due to thrust are transferred through these parts.

See that the case flange is of the proper thickness to give sufficient strength.

6—See that all main bearing shells are tight in place in the bore all around, and flush with the top of the case, being sure to observe that they do not come below the case level, so as to provide a proper fit when the cap is put in place. Otherwise you may have a loose main bearing shell.

loose main bearing shell.

Be sure to have all main bearing studs tight in the lugs, and see that the lugs were not cracked when the studs were put in place.

Screws in the main bearings holding the bearing to the case should not be too near the surface of the bearing metal, and the babbit should be countersunk.

7.—In the main bearing caps note the condition of the babbitt and allow no cracks, checks or excessive porosity.

Note possible cracks at stud holes. Cracks main bearing caps are apt to occur at this oint. Very often main bearing caps are in-

jured by turning down the nuts without the washers or plates being in.

8-All case clamping studs want to be tight in the case and of proper height. Note the condition of the threads.

9—See that the gear case face is machined to allow the proper clearance between the gear case cover and the half-time (magneto) gear. Also observe that the screw bosses allow the proper clearance for the magneto gear.

10—Lower half of crankcase should be carefully scrutinized and the degree of porosity noted. Look for cracks, welds or defective material, especially at corners.

In conclusion, see that both upper and lower alves are scraped clean and all sand or dirt removed.

#### Camshafts

-Check over all measurements of intake cams.

2—Take measurement of rear bearing.

3-Take measurement of front bearing.

4-Take measurement of gear bearing.

5-Size of all front bearings and gear bearings (micrometer).

6-Scleroscope test of cams and bearings. -General inspection as to physical proper-

#### Cam Follower Assemblies

1-Inspection for alignment of cam followers

2-Scleroscope test.

3-General inspection as to physical properties of cam followers and guides.

#### Camshaft Gears

1-Sizing of bored or reamed hole.

2-Inspection in gear center fixture to insure free running.

3-Inspection as to physical properties and finish.

#### Carbureters (Assembly)

This includes a general inspection of the assembly work as follows:

I-Inspection of the throttle valve as to fit and alignment.

4-Inspection of the wiring of screws.

2-Inspection of the throttle valve lever. 3—Inspection of the hot air valve and lever 5—Inspection of body, noting degree of po-

6-See that slow speed adjustment is not plugged.

-Checking up settings.

#### Crankshafts

i-Length over all from thrust bearing cap to half-time gear.

2-Height and width of propeller hub key.

3-Micrometer dimensions of each bearing and crank pin. 4-Inspection as to checks in main bearings and crank pins.

5-General inspection of half-time gear and oil drive gear.

#### Cylinders (Assembly)

-Length of rocker arm support and manifold studs

2—Dismantling of valves to get size of valve stem guides, condition of valves and valve seats in cylinders, testing of valve springs for pressure.

-Size of bore for out-of-roundness and

4-Height from rocker arm support seat to tie-down flanges.

5-General inspection of jackets for porosity. 6-Test with thread gage of spark plug hole and inlet water nipple.

7-Water test, 80 lb. per sq. in.

#### Intake "Y" Assembly

r-Inspection of all studs for length and condition of threads.

2-General inspection for porosity and condition of finish of inner and outer surfaces. 3-Inspection for cracks around stud bosses and water test.

4-Water test, 80 lb. per sq. in.

#### Intake Manifolds

1-Length of stud bosses.

2-Gaging manifold coupling stud hole

- 3-Inspection of inner and outer surfaces.
- 4-General inspection for porosity.
- 5-Alignment of part flanges.
- 6-Water test, 80 lb. per sq. in.

#### Intake Manifold Coupling

1-Inspection of inner and outer surface.

2-General inspection for porosity.

3-Water test, 80 lb. per sq. in.

#### Oil Pump Assembly

Gaging master gear shaft which drives oil-drive pinion.

2-Clearance of gears and running condition of same.

#### Oil Drive Assembly

1-Gaging master gear fit in pinion. 2-Gaging pinion fit in bracket.

3-Checking trueness of bore in bracket to facing of pinion.

#### Piston and Connecting-Rod Assemblies

1-Weighing within limits of 1/8 oz. total variation

2-Testing of frictional resistance of piston pins in piston.

3—Checking skirt for size and distortion with micrometers.

#### Pistons

I-Getting side clearance of piston rings with feeler gage.

2-Condition of piston pin bearing after being rolled in.

3-General inspection for cracks and porosity.

4-O. D. of top and bottom of piston.

5-Depth and width of ring grooves.

#### Connecting-Rods

1-Gaging size of bearings with plug gage.

2-See that rods are of proper hardness as any be indicated by scleroscope or Brinnel may tests.

3-Note length of bolt lugs.

4-General inspection as to porosity, bolts, nuts and bore of bearing.

#### Propeller Hub Assembly

1-Testing with plug gages to determine proper taper and size.

2-Inspection of fit of nuts, radius of bolt heads, cotter pin holes, fit of proppeller hub lock nut and tension of propeller hub nut lock

3-Inspection of keyway with gage to see that key is central.

#### Piston Pins

-Scleroscope test.

2-Location of lock screw holes.

General inspection of outer and inner sur-

4-Check up outside diameter for size.

#### Piston Rings

1-Check width with micrometer.

2-General inspection of physical properties.

#### Valve Action Assemblies

I—Inspection of clearance between rocker arms and yokes.

2-Fit of push rob threads in yokes.

.3-Distortion of push rods.

4-File test of tappets for hardness.

5—General inspection for cracks and assem-ly workmanship, note degree of porosity and artch out for soft solder spots.

#### Thrust Bearing

1-General running condition.

2-Obtain width and outside diameter of bearing.

#### Water Pump

1-Note end thrust of shaft.

2-General inspection for porosity of bodies and assembly workmanship.

3-Inspection on hot water running test for leakage.

#### Pressure Pumps

t-Inspection of general running condition at 4 to 5 lbs. pressure.

2-Inspection of bodies for porosity and as-embly workmanship.

#### Crankshaft (Balancing)

I-Inspection for static and dynamic balance. 2-Inspection for width and thickness of

3-Inspection for fit and finish of oil plugs.

4-Inspection for misalignment of bearings.

5-Gaging propeller hub taper.

6—Gaging thrust bearing lock nut and pro-eller hub nut threads.

7-Gaging dimensions of propeller hub key-

8-Check for trueness.

#### II-Assembly Inspection

Following is a list showing operations for the complete motor which will be referred to numerically in discussing Assembly Inspection:

1-Tap and stud case.

2-Cut fillets and ream. 3-Fit gear covers and clean case.

4-Fit cam followers and cam shaft.

5-Fit crankshaft and oil drive.

6-Fit connecting rods and breather pipes.

7-Fit cylinders

8-Fit manifolds and valve actions.

9-Fit magnetos, timing wiring.

10-Fit lower half, gear case covers and mag-

11-Fit intake pipes, water pump and car-

#### Belting

1-5-hr, limber run. 2-5-hr, official run.

#### Assembly Inspection Details

OPERATION 1. Studding.

I—All stud holes are to be hand-tapped to size and should be slightly countersunk on the inside of the case.

a-All studs are to be hand-threaded and all nickel is to be removed from the end of same, in case of nickeling, from the case

3-All studs should be tried to see that they are absolutely tight in the case.

4-At this point in the assembly the studs are not to be drilled for cotter pins.

-Note proper location of name plate. OPERATION 2. Reaming of main bearings.

I-Examine all main bearings carefully and note degree of porosity or defective babbit. Be sure that there is sufficient bearing metal for reaming and that it has a good bond with the shell. Also see that the shell fits tight in the case bore.

2—Examine all grooves and oil retainers to see that they are machined to drawing; also that all screw heads are set deep enough to have sufficient clearance after bearings are have su finished.

3—After main bearings are finish-reamed in the case, try them for alignment by inserting a testing bar o.oor in. smaller in diameter than the main bearings. Note that the bar can be rotated freely by hand and moves through the bearings without springing.

4—All bearings must be reamed 0.002 in. larger than the crankshaft main bearings, with a 0.0005 in. tolerance under or over. These working limits on the bearings are determined by plug gages. No burnishing or scraping should be tolerated. The main bearings are to be reamed smooth.

OPERATION 3. Case cleaned.

1-Note that fits of gear case cover, magneto drive half covers and thrust clamp are correct.

Dil grooves should be cut in thrust clamp and must correspond with those in the lower half.

3.—The case should be scraped smooth and all sharp corners removed, and the case should be washed clean with gasoline before proceeding with next operation.

OPERATION 4. Camshaft and cam followers

r-All cam follower guides are to be properly fitted to the case.

2—Examine cam followers for cracks and checks, and see that they have the proper clearance in the guides and do not bind. See that the case in spot-faced under the retaining screws and that they are tight in the

3—See that the cam bearings fit tight in the case and that the camshaft rotates freely in the bearings. All bearings must be reamed o.eors in. larger than the camshaft journal, with a 0.0005 in. tolerance under and over. The shaft must have at least 0.002 in. end-play and not more than 0.006 in. end-play. See that the cam followers follow the cams properly. properly.

4-Examine the front cam bearing carefully for cracks.

5—See that all pilot screw holes are tapped to the correct-size and that the under side of the screw heads fits flush with the boss.

OPERATION 5. Fitting of crankshaft and oil

drive.

I—Before fitting crankshaft, examine all bearings carefully and see that they are free and

a-Examine crankshaft, seeing that all pins and main bearings are free from chocks, cracks or rust and have all sharp edges removed from checks. Examine gear and see that all teeth are milled uniformly.

3-Burnishing bearings and scraping should not be allowed unless authorized by inspector. See that sides are filed for crankshait and

4-Shaft must rotate freely in bearings. A minimum clearance of 0.045 in. is allowed between the cheek and the side of the bearings on the thrust side, and 0.025 in. on the opposite side.

6-After the crankshaft has been inspected and passed, remove the front bearing. Wire up the main bearing castle nuts. Drill and tap the holes and fix the studs for the oil drive pinion brackets.

-Apply and fit the oil drive pinion bracket the front bearing.

8—See that the shaft of the gear rotates freely in the bushing.

9—When fitting, try the gears and line them up. Back lash in the gears to be between the limits of 0.003 in. and 0.006 in. Outside diameter of oil drive to be central with shaft within 0.010 in. and bottom set level within 0.0015 in.

ro—After it has been inspected and passed, remove bracket and front main bearing cap. Drill and tap threads in front bearing cap and bracket for retaining screws. Replace bearing cap and finally fix bracket.

II-Replace camshaft gear and try back lash, allowing a minimum of 0.003 in. and a maximum of 0.006 in.

OPERATION 6. Fit connecting rods and breather pipes.

r-Assemble breather pipes to case, noting thickness of flange and length of studs.

2—See that holes in studs are drilled correctly for cotter pins to line up with castellation of nuts. Assemble connecting rods and pistons to crankshaft pins. Burnishing of bearings should not be permitted. Examine bearings for porosity and poor bond between shell and babbitt.

3-When assembled, try for fit, seeing that all connecting rods have the necessary clearance between bearings and pins. The clearance here should be 0.0015 in. to 0.002 in.

4—See that all nuts have cotter keys and are pulled up snugly.

OPERATION 7. Fit cylinders.

r—Note the degree of porosity in the top and lower beads and see that the nickel-plating does not peel off, if the rod is nickel plated. Water jackets to be free from bad dents. See that no cracks occur around the studs and bosses of the water outlet seat. All nuts on the bottom flange of the cylinders must have lock washers and be snugly pulled up. Lock washers to be replaced with cotter pins in overhaul.

2-After cylinders have been fitted, inspect for line-up. Intake faces of cylinders are to be in alignment within 0.05 in. Intake manifolds to be in alignment within 0.05 in. Water outlet seats to be in alignment within 0.025 in.

3-Top of valve stems to be in alignment within 0.005 in. OPERATION 8. Fit manifolds and valve action.

I—Assemble valve actions to motor.

2—Examine rocker arms and try clearance in bearing pins; also look for cracks and machine

3-Turn the camshaft over with socket wrench to try all valve actions. OPERATION 9. Magneto timing and wiring

1—Time motor from No. 1 cylinder and mark gears. Make out timing clip and place it with assembly operation card.

2-Fix name plate.

3-See that all wires are properly insulated. Note conditions of terminals.

OPERATION 10. Fit covers, magneto covers. Fit lower half, gear case

covers, magneto covers.

1—Reverse motor on stand and rewash it.

2—Make general inspection to see that all is clean before pouring in oil. Oil must be absolutely clean and of specified grade.

3—Clean lower half of case and splash pans.

Assemble lower half to upper half. All nuts on flange to be snugly pulled up.

4—Assemble thrust bearing and clamp. Try clearance between oil slinger and inside radius clamp, which should not be less than o.oro in. all around. See that all fillister head screws are wired.

are wired.

5—Fit gear case cover to motor. See that screw holes are not tapped oversize and threads not stripped. Clearance between gear case opening and crankshaft gear journal should be between 0.006 and 0.008 in.

OPERATION 11. Fit intake pipes, water pump, carbureter.

I-Assemble intake water pipe. See that all nuts on cylinder nipple joints are fastened tight. All rubber connections to be tightly fixed to prevent water leakage.

2—Assemble pressure pump and tachometer rive to motor. See that all fixture screws ave lock washers and are snugly pulled up.

3-Assemble intake gas pipe, intake "Y" and arbureter, carbureter supports, braces, etc., to motor.

4—Try lever of butterfly throttle for ing and closing and tension of spring. lever of air intake. Try slow speed as See that carbureter is fitted and wire properly and all parts are intact.

.5-Assemble hot water pipes to motor.

6-Assemble oil feed pipes to motor.

7-Fix ignition tubes to manifold and eet cables.

#### III-Overhaul and Test

I—After an engine has been overhauled or assembled it should have a limber run, in order that all new parts installed can work

a—New engines generally are limbered by power other than their own at about 300 r.p.m., until the motor can be turned over freely by hand.

While thus being limbered motors she inspected from time to time to note following:

(1) Cylinders overheating.

(2) Overheating of water pump shaft bush-

(3) Knocks from piston pins.

(4) Noisy valve actions.

(5) All working parts to be well oiled.

3—Oil pressure is adjusted to a suitable fig-re at about 300 r.p.m. This is done at this me for the sake of convenience.

4—When the engine is run under its own power at 1400 r.p.m. the oil pressure should be between 45 lb. and 75 lb. The best results are usually obtained when the pressure is 65 lbs.

5—Engines having had a limber or belt rum should then be given a limber run under their own power for 5 hr., starting the first hour at 900 r.p.m., the second hour at 1,000 r.p.m., the third hour at 1,100 r.p.m., the fourth hour at 1200 r.p.m. and the fifth hour at 1400 r.p.m. 6—Inspection must be made from time to time to note if the motor is running smoothly.

(1) No oil leaks.
(2) No water leaks.
(3) Magnetos are working properly.
(4) Take reading of water at inlet and outet. Intake should be about 110 deg. and outlet
(5) Take reading of oil pressure.
(6) Look for oil leaks at thrust bearing and lamps.

(7) Oil leaks at magneto drive shaft oil de-flector and crankcase joints.

clamps.

(7) Oil leaks at magneto drive shaft oil defector and crankcase joints.

8—At the end of 5 hr. run, valve clearance must be adjusted to proper valve.

9—Remove oil from sump and replace with clean oil. It is then ready for 5 hr. full power run.

10—Start engine and run 15 min. to warm up—then open up to full power 1400 r.p.m.

11—On this run a very careful inspection must be maintained.

(1) Take readings of oil pressure, temperature of water inlet and outlet.

(2) Note overheating of cylinders.

(3) Note proper working of magneto.

(4) Take readings of torque in lb. and statle thrust in lb.

12—At the end of 5 hr. full power run, the following defects may appear:

(1) Oil leaks at thrust bearing clamp ring, due to a poor gasket or loose thrust bearing clamp bolts.

(2) Oil leaks at thrust bearing clamp ring, due to not having enough clearance between ring and thrust bearing clamp. Nothing less than o.oto in. to be tolerated.

(3) Oil leaks at magneto drive shaft.

(4) Inspect for water leaks on all cylinders, water connections and water pump packing glands. Observe carefully brazing of cylinder water jackets at bottom and top, as the brazing sometimes opens.

(5) Valve actions that are out of alignment will be noisy. Weak intake push rod springs will also cause noisy valve action.

(6) Inspect intake and exhaust push rod yoke pins for wear.

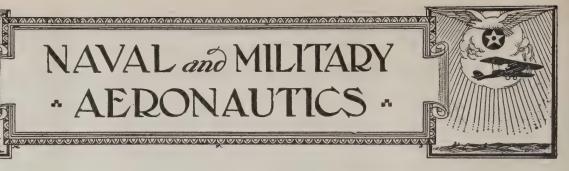
(7) Check valve clearance.

(8) Inspect manifold gaskets, elbowgaskets, and carbureter gaskets. Air leaks at these points will make engine run uneven and prevent throttling down to low speed. The engine will also overheat.

(5) Carbureter should be checked up for the settings.



## NAVAL and MILITARY AERONAUTICS



#### American Flyers Organize Squadron to Aid Polish Army

Nine American aviators that fought with the British, French and United States armies, two of them from Brooklyn, have organized an aero squadron at Warsaw and will fight with the Poles this winter at Vilna. News of their arrival at American Red Cross headquarters at Warsaw was reported by the Atlantic Division of the Red Cross.

In honor of the Polish patriot and friend of American independence the group has been named the Kosciusco Aero Squadron, and has been ordintal Squadron, and has been enlisted as a combat unit of the Polish army. They will use scout planes and act as a pursuit

The squadron was formed by Captain Merian C. Cooper, of Jacksonville, Fla., and Major Cedric Fauntleroy, of Chicago. Major Fauntleroy is in command. He was a member of the Lafayette Flying Corps and is an aviation expert. Captain Cooper served two years with the Americans in France and was wounded in the battle of the Argonne, taken prisoner by the Germans and held more than two months until the armistice. Later he went to Poland.

The two Brooklyn men are Captain Jo-The two Brooklyn men are Capitali Joseph C. Stehlin, of Sheepshead Bay, and Captain Edward J. Corsi, both formerly in the Lafayette Corps. Captain Corsi has the Croix de Guerre with palms. The other members are Lieutenant Carl other members are Lieutenant Carl Clarke, Tulsa, Okla., a member of the Lafayette Corps before he served in the A. E. F.; Captain A. H. Kelly, of Richmond, Va., who was leading observer of the Ninety-sixth Bombardment Squadron, with seven German aeroplanes to his credit; Lieutenant Kenneth O. Shrewsbury, Wilmington, Del.; Lieutenant E. Noble, Boston, and Lieutenant George M. Crawford, Wilmington, Del.

#### Bill Provides for Sale of Gas on U. S. Fields

Washington.-A bill has been introduced in Congress which authorizes the War Department to sell gasoline, oil and aircraft supplies to civilian aviators at the contract price plus 10 per cent when they land near aviation fields and are in need of asistance for the continuation of their journey or for the protection of the passengers or crew. The provision in the bill is to the effect that only limited amounts are to be sold, the limit being the quantity necessary to enable the aviator to reach the nearest point where he can purchase supplies.

#### Army and Navy Will Seek Helium Sources

Washington.—A joint Army and Navy Board has been created "for the purpose of co-ordinating the various helium gas activities and requirements of the various Government Bureaus, including full con-

trol over the operation of the present and future Government owned helium production plants, disposition of helium products, the conduct or supervision of conduct of further experiments undertaken with a view toward increasing the efficiency of the production plants and to control further steps for conserving such sources of helium as may be deemed expedient.

Col. C. DeF. Chandler, Air Service, Chief, Balloon and Airship Division, is chairman of the board, with Major P. Pleiss, Air Service, as alternate. Commander A. K. Atkins, U. S. N., is a member with Commander H. T. Dyer as alternate. Because of the fact that so many of the problems in connection with helium gas concerns the Department of the Interior, the Bureau of Mines of the Department has been invited to have a representative meet with the board.

#### Mosaic More Accurate Than Survey

Colonel H. E. Eames, Infantry Officer at Camp Benning, gave special praise to the work performed by the Photographic Unit of the Air Service in charge of Captain A. W. Stevens, in making a mosaic of Camp Benning, Columbus, Ga. Colonel Eames stated that the accuracy of the mosaic of Camp Benning was astonishing and he was unable to discover any material error in the scale and not as much error as exists in certain parts of the topographical survey, and that he considered as a whole, the mosaic much more accurate than any survey could be unless the survey was made at great expense of both time and money. Colonel Eames also stated that the quickness with which the work was done, its accuracy, and its complete usefulness for this service, reflect credit on the pilots performing the work, as well as the Air Service.

#### Missouri Aeronautical Society Favors Separate Militia Aero Corps

At a recent meeting of the Missouri Aeronautical Society, of which Major A. B. Lambert is Chairman, the Society went on record as favoring the organization of a separate Aero Corps for National Guard and Militia. The following is the resolution that was passed:

RESOLVED, Therefore, that the Missouri Aeronautical Reserve Corps favors a separate branch for the Air Service; further, that we strongly recommend the passage of Senate Bill 2693, July 31, 1919, which provides for a separate Air Service, and further, that each and every Representative from Missouri in Congress be requested to give his support to the same, and that a copy of this resolution be sent to the Committee on Military Affairs.

The protection of community interests and the sovereign rights of each and every State, and the limited authority of

Federal Troops prompts, through necessity, the organization of State Troops, Militia, or National Guard, and thus throughout the United States there is maintained a certain active military force supplementing the Infantry and Artillery of the United States Army. It is impracticable to organize or maintain an aviation unit with a regiment of State Troops, consequently one of the most important branches of the military service is not represented in the development or building up of the respective State Military Forces, and the Air Service is left to work out its own destiny. It is a con-ceded fact by authorities that the prime factor of successful military operations is in the equal co-operation of all branches of the service. A chain is as strong as its weakest link, and an inadestrong as its weakest link, and an inade-quate Air Service will decrease by fifty per cent the efficiency of our Army and Navy. Therefore something should be done and provisions made for the creation of an active Aviation Reserve Force, proceeding along parallel lines with the other branches of the service,

There are five thousand former officers of the Air Service in the United States who are qualified flyers. We have many aviation flying fields scattered throughout the country. Some of these fields are not in active use. The War Department has, or did have, a large number of aeroplanes which will eventually go to rot in the hangars. Many former officers of the Air Service desire to continue flying, many to own their own aeroplanes, but they are hindered from this because a private aviation field or hangar is prohibitive in cost of maintainance. Our aviation fields could therefore be put into use for a very vital and neces-

ry purpose. Therefore, if the flying fields of the United States are placed at the disposal of the former oflicers of the Air Service, with the privilege of maintaining their own aeroplanes on these fields, landing on these fields at will, using them for cross-country flights, and housing their aeroplanes in the vacant hangars, and if the War Department, by authority of Congress, could place at the disposal of all Reserve Officers say one or two aeroall Reserve Concers say one of two acro-planes at each station, it will be the means of creating an active Aviation Re-serve Corps and keeping these flyers in practice. It will also keep alive one of the most important subjects which at this time is on the decline in the United States, but is being greatly stimulated in other countries.

RESOLVED, Therefore, that Congress be petitioned to pass an Act whereby all former officers of the Air Service, who are qualified aeroplane or balloon pilots, be extended the use of all flying fields and hangars, and be furnished with gasoline, oil and spare parts at cost; and further, that there should be maintained in good condition two or more aeroplanes at each flying field for the use of qualified flyers who can conform to requirements and conditions of safety to be imposed by the War Department.

# THE ORDNANCE ENGINEERING TYPE "B" PURSUIT FIGHTER

The Ordnance Engineering Corporation, builders of successful military aeroplanes for more than three years, has adopted the name "Orenco" to designate the products of its aircraft department. The achievements of the Orenco military aeroplanes have often been brought to public attention, but as they were invariably referred to as "Ordnance" aeroplanes, were believed by many to have been designed by the Ordnance Branch of the Army. To correct this impression, all the planes designed and built by the aircraft department of the Ordnance Engineering Corporation are to be known as "Orenco" aeroplanes. The name Orenco is composed of the first two letters in each word of the corporation's name.

During the war the designers of Orenco aeroplanes were constantly in close touch with the military authorities engaged in developing up-to-date training and fighting aircraft for the rapidly increasing air service. The first Orenco plane, the Type "A," was a two-seater primary training tractor with dual control and side-by-side seating. Students were trained in less time than when the tandem type plane was used, for it was possible for the pupil to observe the actual movements of the pilot in bringing about the various attitudes of flight.

The Type "B" Pursuit Fighter, a fast plane designed to carry a novel arrangement of experimental machine guns, was one of the fastest planes of its kind. With a 160 H.P. Gnome engine the speed was 135 miles an hour. Urgent need for advanced training planes led to the conversion of this plane to a training machine called the Type "C." This plane with an 80 H.P. Le Rhone engine was identical in all other respects to the Type "B" and its performances were no less remarkable. Its high speed was 102 miles an hour and the landing speed, which was of considerable importance, was only 40 miles an hour.

One of the fastest planes now in the U. S. Army Air Service is the Orenco Type "D" Pursuit Fighter, equipped with

a 300 H.P. Hispano-Suiza engine. Near the ground the speed is 147 miles an hour and the landing speed 50 miles. The "D" machines contracted for by the Army were provided with twin synchronized Browning machine guns neatly mounted above the engine and entirely enclosed by the cowling. The newest and most complete accessories were installed, including leakproof gas tanks of the highest development. General specifications of the Type "D" Pursuit Fighter are as follows:

Span, upper wing
Span, lower wing28' 0"
Chord, both wings 5' 0"
Gap between wings 4' 4"
Stagger 1' 0"
Length21' 6"
Height 8' 3"
Weight, unloaded1666 lbs.
Useful load 766 lbs.
Weight per H.P 8.1 lbs.
Weight per sq. ft 9.3 lbs.

Fuel weighing 330 pounds gives an action radius equal to 275 miles at full speed. The climb to 5,000 feet is accomplished in 4 minutes 20 seconds; to 15,000 feet, 16 minutes 45 seconds. In landing, the machine comes to a complete rest after a run of about 250 feet.

A further development of the Type "D" design is the "D2" Pursuit Fighter, designed to make a speed of 165 miles an hour with a 300 H.P. Hispano-Suiza engine.

Other Orenco designs for military planes include the "C2" Advanced Training Plane; the "C3" Pursuit Training Plane; the "C4" Cross-Country Plane; the 400 H.P. Type "E" Armored Fighter; the Type "E2" Infantry Liaison Plane and the twin-motored Type "H2" Artillery Observation and Fighting Aeroplane.

At present the company is completing the first of its commercial planes, the Type "F" Tourist provided with a 150 H.P. Hispano-Suiza engine. This plane can travel a distance of 290 miles at the

rate of about 90 miles an hour, carrying the pilot and three passengers. The sideby-side seating arrangement is comfortable and convenient. Dual controls in the rear cockpit make it possible for an inexperienced passenger to handle the machine at a safe altitude, as the pilot is able to resume control at any instant. The Type "F" plane promises to become popular because of the simplicity of its construction, the ease with which parts can be replaced and the general efficiency and attractiveness of the design. For carrying mail or light express the Type "F" may be slightly modified to meet the requirements of such special services. By the substitution of floats instead of wheels, the Type "C" plane makes a neat hydro-aeroplane suitable for pleasure purposes.

For general passenger carrying and sporting uses, where lakes and rivers are available, the Type "I" four-seater flying boat is equivalent to the Type "F" Tourister in regards to the attractiveness of its seating arrangement and its appeal to those who seek a plane that is able to withstand continual hard usage and yet combined with the utmost in modern conveniences. A closed hood covers the passengers' and pilots' compartments, protecting them from wind and spray.

### Famed Canadian Ace Dies

Toronto,—Major A. E. McKeever, M. C., D. S. C., one of the best known Canadian aces in the great war, and credited with the destruction of forty-five German machines, died in the General Hospital as the result of an operation.

In an automobile accident near Stratford, Ontario, some time ago, he suffered a broken leg and internal injuries. He was twenty-five years of age.



The Orenco Type "B" Pursuit Fighter



### FOREIGN **NEWS**



### British Imperial Antarctic Expedition to Fly Last 750 Miles to Pole

British Imperial Antarctic Expedition to Fly Last 750 Miles to Pole London.—Plans for reaching the South Pole by aeroplane were outlined by John L. Cope, who heads the British imperial Antarctic expedition leaving England next June. Cope, who is no stranger to the Antarctic, having accompanied Shackleton and the transantarctic expedition of 1914-17, expects to make a five years' stay this time, and hopes to secure valuable scientific information particularly in regard to meterorology in its relation to agriculture.

Wireless stations will be established at Scott Island and New Harbor, and the last 750 miles to the Pole will be done by aeroplane.

"The principal difficulty we have to deal with," declared Cope, "is the weight of the equipment we shall have to carry. We shall have to take a sledge and extra provisions to enable us to get back in case the aeroplane breaks down, so it will be necessary to cut down our fuel to the minimum, or it will be impossible to lift the plane for crossing the mountains.

the minimum, or it will be suppossible to mountains.

"We propose to set off with as much petrol as we can carry and then halfway on the outward journey, just before we get to a range of mountains that we have to cross, to dump half of it and pick it up again coming back. By using an aeroplane a flight of twenty to twenty-five hours will obviate a tortuous journey lasting many days."

### General Sykes Report on Civil Aviation

London.—Major-General Sir F. H. Sykes issued a report recently covering the activities of the Department of Civil Aviation from May 1, 1919, to October 31, 1919. The following is of interest:

The following approximate figures, which have been supplied voluntarily by certain of the firms engaged in civil air traffic, are interesting as showing the extent of the work carried out, and for the mileage covered, the number of accidents must be regarded as remarkably small:—

Number of hours flown	
Number of flights	
Number of passengers	
Approximate mileage 303,000	
Total number of accidents	
Number of fatal accidents	
Total Per 1,000 Per 1,000	
Numbers. Flights. Hours Flown.	
Pilots killed 2 .095 .5	
Pilots injured 6 .286 1.5	
Passengers killed nil nil nil	
Passengers injured 10 .476 2.5	
Percentage of passengers injured to those carried, .019; in	
other words, for every 5,200 passengers carried only one has	
been injured.	

other words, for every 5,200 passengers carried only one has been injured.

If this question is answered in the affirmative there appaer to be three methods of assisting it:

(1) By means of direct Government subsidies—it is in this way that France has decided to act, and 18,000,000 francs (£720,000) have already been earmarked for this purpose.

(2) By recognizing that at the beginning the British aircraft industry cannot stand on its own feet, and that to insure its existence, although foreign to usual British practice, some form of direct Government assistance, probably in the shape of a grant to approved aerial transport companies for mileage and weight carried, is a necessity.

(3) By following the principle usually accepted in this country, that if an industry is to survive it must stand as nearly as possible by itself, and that a policy of "doles" is unsound. In this case the assistance given would take the indirect form of the provision of certain "key" aerodromes and shed accommodation at home and on the Empire routes; and the collation and issue of information, including meterological data, and the provision of communications.

The problem is how best to tide over the difficult transition period through which we are passing. Adhesion to the British principle of independent private enterprise will undoubtedly be right eventually, but if a limited industry is to be maintained—as it must be to meet the require-

ments of the Royal Air Force—it is for consideration whether it will not be necessary to adopt a combination of (2) and (3) above.

In the same way as ships require harbors, so aeroplanes and seaplanes require aerodromes, which have to be built, inspected and licensed. Licenses also are necessary for the pilots competent to control the machines, and for the officials at the aerodromes qualified to pass machines as fit for flying, while every civil machine has to be registered and numbered in the same way as a motor car, and, if flying for hire, must in addition be certified as "airworthy." A special branch of the Department of Civil Aviation deals with this and kindred questions, and between May 1 and October 31 has granted the following licenses and certificates:

Licenses for pilots	374
Licenses for ground engineers	
Dicenses for engineers	1
	2
Licenses for aerodromes	92
Certificates of registration	303
Certificates of airworthiness	241

dromes.

During the six months under review an approximate sum of £2,000 has been received at Hounslow, in payment of housing and accommodation fees, etc., apart from the sale of petrol and oil. From this fact it is fair to assume that a definite revenue will be derived from the main acordromes of the future.

### Jap Aviators Score in Long Distance Flight

Tokio.—A long distance mail flight of heavier-than-air machines was conducted the other day when two or three aviators who started from Tokio reached the city of Csaka, a distance of 352 miles carrying pouches of mail. A great crowd at Osaka welcomed the airmen. The flight was held under the auspices of the Imperial Aviation Society, which is headed by Lieut. Gen. Nagaoka.

### British Air Policy Defined

British Air Policy Defined

London.—Winston Spencer Churchill, Secretary for War, has prepared a scheme for the Royal Air Force organization in peace time based on the expenditure of £15,000,000 (\$75,000,000) yearly. The main outlines provide for one flight squadron for each division of the army, to cooperate with the troops in all stages of their training, besides three general service squadrons, and also one or more squadrons for cooperation with the artillery.

The fleet will have permanently three aeroplane squadrons and two seaplane squadrons. India will have eight service squadrons, Mesopotamia three and Egypt seven, while the naval bases at Malta, in the eastern Mediterranean and probably Alexandria, will each have one small seaplane unit.

### Germany Races to Win Air Market

Germany Races to Win Air Market

London.—A great struggle for "the flying markets" of the world is described in a memorandum by the Air Ministry on the progress of civil aviation in foreign countries. France and Italy are Great Britain's most serious competitors, but Germany already has made enormous progress.

Partly to avoid the terms of the peace treaty and partly to make an early bid for foreign markets large numbers of German aeroplanes and engines have been sold at extremely low figures to Norway, Sweden, Holland, Denmark and Switzerland. Germany already has secured a substantial footing in these countries.

# Aeroplane Is To Be Given To Australia

London.-The aeroplane which built the machine in which Captain Ross-Smith flew from England to Australia, announces that it plans to present the machine to the Commonwealth Government.

### Text of the King's Message

London.-The text of the cable message which the King sent to Captain Ross-Smith on his completion of the flight to Australia was as follows:

"I am delighted at your safe arrival. Your success will bring Australia nearer the mother country. I warmly congratulate you and your crew."

The text of the Premier's message was as follows:

"Heartiest congratulations. Your flight shows how the inventions of war have advanced the progress of peace."



The Napier works at Acton, England. This excellent example of commercial aerial photography was made by Captain Gathergood, winner of the London Aerial Derby



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. M-Mahon



### The Motorcycle Engined Aeroplane—(Continued)

The rudder is made of steel tubing and wood. The two main members are steel, the ribs and edging are composed of wood. The ribs are shaped as shown in A, B and C. They are made of wood and battens. The webbing should be ½8" veneer shaped as shown, and the battens ½8" x½" spruce, fastened with hot glue and nails. Holes are drilled in the webs as shown—one 1" in diameter, the other ¾4". The holes are 10½" between centers. When the ribs are finished they are slipped onto the spars—(one 1" tube and one ¾4" tube) to the proper stations, then fastened by drilling a hole with a No. 50 drill through the rib and spar, and a wire nail clinched after passing through. When ribs are fastened the ends of the tubing should be flattened and split as shown. The edging ¾8" x¾8" ash is then attached to the forward ends of ribs by strips of tin and nails. A wire is then attached for the trailing edge and held in place with strips of tin. No. 30 piano steel wire is wrapped around the rear spar for a few turns at positions shown and soldered securely. Ends about 6" long are allowed to stand out to for a loop later for attaching the control wires.

The elevator is constructed exactly like the rudder. All measurements of these parts can be determined from the scale at the right. The rudder is made of steel tubing and wood. The two

scale at the right.

scale at the right.

The engine can be any stock motorcycle engine, of 15 to 18 H.P., but it can be lightened considerably by drilling holes in the skirt of the pistons, connecting rods and even in the fly wheels if care is taken to preserve the balance. Some manufacturers of motorcycles supply a special four valve racing cylinder head which, if used, would greatly increase the power. Ports drilled in the cylinders at a point just above the piston when it is at bottom center, would assist in exhausting the burnt gas and eliminate back pressure on the pistons when exhausting. A propeller hub plate must be made with a tapered hole and a key way for attaching to the crankshaft. Two pieces of 1" angle iron ½" thick and about 8" long should be welded to the lugs on the crankcase to provide a means for holding the motor rigid, crankcase to provide a means for holding the motor rigid, as shown. A streamline gas tank holding three gallons of gas and two quarts of oil should be placed behind the motor above the body. A 5-foot diameter 4-foot pitch propeller should be used.

Before starting on the wing construction it might be well to take up the method of making a pattern for constructing the ribs. The accompanying drawing is for the USA No. 1 wing curve for the machine outlined in preceding issues.

When laying out the upper and lower curves a line should be drawn horizontally across a 6 foot sheet of paper. Two

When laying out the upper and lower curves a line should be drawn horizontally across a 6 foot sheet of paper. Two marks should be placed on this 60 inches apart. Then the distance between these marks should be divided into ten equal parts and lines drawn upward from the base line at each of these points for a distance of 6 inches. This will give ten equal parts upon completion. The nose or entering edge of any wing curve is the most important part so we will break up the first two distances to give us a closer check. The first space at the right should be divided into four parts, the next or second from the right should be divided into two the next or second from the right should be divided into two parts. A curve of any wing is arrived at by marking points for the upper and lower cambers separately. That is, we find the lower camber line first, then the upper bearing in mind that all measuring is from the original base line.

When data on curves are published these dimensions are given in percentage of the chord. The reason for this is that the same shape of the wing section can be laid out for

given in percentage of the chord. The reason for this is that the same shape of the wing section can be laid out for any chord. The writer has laid this curve out in inches working to the nearest sixteenth of an inch in doing so. Start at the right hand side first, then look for the dimension for the first point on the lower curve; lay it out, moving to the left for the next line. Now mark the point the distance from the base line as specified working to the left, taking each station and marking the points until the last station at the left is reached. With a flexible rule or any other similar instrument, draw a line that starts at the farthest left point, passing over each point until the extreme right est left point, passing over each point until the extreme right point is reached. This will be the bottom camber. Then lay out the upper camber by marking points starting from the right as before, working to the left. Then draw the upper curve by passing through all the points. Now we have the USA No. 1 wing curve for a 5 foot chord. The ribs are made of a center web with battens nailed top and bottom. These are 3/16" thick, so in order to have the webs correct, we must draw a line 3/16" away from the upper and lower cambers. See inside dotted line in the drawing. The portion in between the dotted lines is then the pattern for the rib webs. Spaces must be allowed for the wing spars and entering edge. The webs are lightened by cutting out

most of it as shown.

Webs are made of 1/8" veneer where possible but if this is not available use 3/16" spruce or white pine.

The characteristics of the USA No. 1 curve are given in the following table:

		0. 0. 11. 1	fro	stance of C. P. om leading edge, of fractional part
L of i	Ky	Kx	L/D	of chord.
-4°	000399	.0001515	2.64	
-2°	.000156	.0000905	1.72	
—1°	.000432	.0000700	6.15	.620
0°	.000721	.0000653	11.00	.530
1°	.000936	.0000670	14.00	.463
2°	.001146	.0000688	16.60	.415
4°	.001510	.0000860	17.50	.340
6°	.001878	.0001158	16.20	.316
8°	.002230	.0001558	14.30	.303
10°	.002580	.0002055	12.60	.290
12°	.002910	.0002595	11.20	.283

For the benefit of those who are not acquainted with the method of reading the list given I will describe briefly its use. The wing curves are tested in a wind tunnel. The engineer in charge of these tests makes up a chart that shows the coefficient of lift which is known in the above table as Ky, the coefficient of drift or drag which is Kx, the ratio of lift to drift or L/D. The center of pressure can be located at any angle by looking in the column opposite the angle of incidence which is known as L of i. We know that this particular machine would weigh about 200 lbs. and with pilot gas, etc., it will amount to about 400 lbs. A slow flying this particular machine would weigh about 200 lbs. and with pilot, gas, etc., it will amount to about 400 lbs. A slow flying speed of 35 M.P.H. is desired to insure safe landings. In the column headed Ky we look for the highest coefficient and find this to be .003165 which is located opposite 14°. Then in order to keep the machine flying at its lowest speed, it would be necessary to drop the tail until the wings were at an angle of 14° with the line of flight. Then in order to find the surface necessary we simply divide the weight by the coefficient just found multiplied by the square of the speed we wish to travel at. wish to travel at

 $400 \div .003165 \times 1225 = 400 \div 3.877 = 103 \text{ sq. ft}$ which is about the amount of surface we have. the angle at which we must set the wings when flying at the maximum speed by dividing the weight by the area, multiplied by the square of the speed. If we wish to fly at a speed of 50 miles per hour the 400 is divided by 103, multiplied by

the square of the speed or 2500 is  $400 \div 103 \times 2500 = 400 \div 257500 = .00155$ Looking in the Ky column this occurs at an angle slightly greater than 4°. We must then set the wings at a trifle greater than 4°.

The resistance of a wing at any speed can be determined by the following rule: to find the resistance of a wing multiply the Kx by the area and the product of these by the square of the speed. Using this rule, we find the Kx opposite the angle we will set our wings—namely 4°, to be .0000860. This multiplied by the area 103 sq. ft. gives .008858. This product multiplied by the square of the speed 50 M.P.H. or 2500 we find to be 22.14 or 22 lbs. or resistance at 50 M.P.H.

As it requires --- of a horse power to overcome 1 pound

of resistance at 1 mile per hour, then by multiplying 22 (which is the resistance) by 50 (which is the speed) and dividing this product by 375 we will find the horse power.  $22 \times 50$ 

= 2.93 or nearly 3 horse power will be needed to drag the wing through the air at 50 M.P.H. at an angle of 4°. 375

(To be continued)



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

How to extinguish the bore ought to rank among the fine arts, and the airman in the following story certainly scored.

He was a particularly tiresome and inquisitive old gentleman, and after politely replying to a number of questions fired at him, the young flying officer, who unfortunately happened to be travelling in the same railway carriage, began to be a bit tired.

"That's a terrible poison that's just been discovered," he said to the old gentleman at last.

The latter pricked up his ears "What's it called," he asked excitedly.

"Aeroplane poison," said the airman. "Is it very deadly?" asked the other.

"I should say so!" was the reply.

"How much would kill a person?" went on the tireless

The flying man's eyes twinkled. "One drop!" he said. Then silence reigned.—The Joystick.



Small Boy: Can I have them wheels, guv'nor?

Courtesy The Passing Show.

### A Farmer's Letter to His Absent Sweetheart

(Under Modern Mail Conditions) By JAMES J. MONTAGUE

I like to get your letters, love, I miss you every day, I'm dull and sad and desolute whenever you're away. But if it's just the same to you, please make your missives light,

And don't enclose remembrances in everything you write. This may seem trifling, darling, but it means a lot to me, For they're using flying postmen on the R. F. D.

Last night a billet doux from you destroyed my Maltese cat, Just dropped him, ruined in his tracks—the knife you sent did that.

The book of verse that you enclosed to me the other day Impinged upon the hired man, and now he's gone away. And hired men are very scarce these busy days to me, And very hard to come by on the R. F. D.

That cigarette case was a dream, but it was my hard luck To lean upon the letter box the moment that it struck. And though I would have rhapsodized on getting it, no doubt, My joy was somewhat dampened by the fact that I was out. For when things fall they will fall hard, and when they light

I miss the dear old flivvers on the R. F. D.

I love you just the same, my dear, as in the days of yore, And every day that you're away I miss you more and more. But if you'll write a dozen sheets, instead of sixty-five, When you return there'll be more chance of finding me alive. For when it drops five thousand feet, the merest note, you

May croak your doting lover on the R. F. D.

### Things the Editor Is Supposed to Know

Angeline-We are inclined to agree with you in your statement that you have found all aviators to be superstitious. Our research work on the subject bears out your contention in every way. It was just the other day that we met a chap who had very strenuous objections to attempting to do a tailspin from one hundred feet, on a Friday.

Gertie-You're wrong, Child, you're wrong. strut is not a new jazz onestep nor yet is it a Heavenly cake-

walk. Do you get the drift.

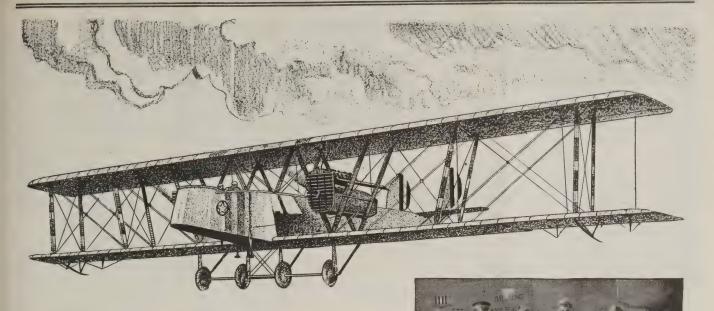
Cyril—We have been unable to discover any reference to aeronautics previous to the Montgolfier brothers but the office boy, who was brought up, so far, in a pious atmosphere, says he distinctly remembers reading that a chap named Esau, who lived some years previous to the Montgolfiers, was prevailed upon by his brother to sell his heirship. Try us again, Cyril old chap, but go easy next time. Remember, the Lord put a head on a man for the same reason he put one on a pin, namely, to keep it from going too far.

### He Wasn't Impressed

A certain Canadian battalion was under orders to proceed overseas, and one of its members, whom we will call Private Jones, had committed an offense—refused to obey an order given by an N.C.O. He was brought before the commanding officer and the punishment given him was that he be marched before the whole battalion carrying his full pack. After being marched up and down and between files for about half an hour, the C.O. stopped him and inquried:

"Well, Jones, what do you think about it"

Jones replied, "Well, sir, they are the rottenest bunch I ever inspected."



CREW OF "ROUND-THE-RIM" MARTIN BOMBER From left to right—Col. R. S. Hartz, Sergt. John Harding, Jr., Lieut. E. E. Harmon, Pilot, Sergt. Jerry Lobias.

# "Round the Rim" in a Valsparred 'Plane

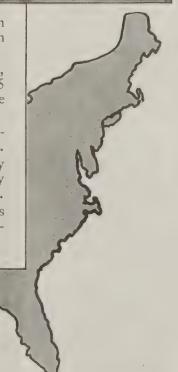
Like all the airplanes built by the Glenn L. Martin Company, the gallant "Round-the-Rim" ship shown above is Valsparred.

Colonel Hartz, commander of the expedition, states that this 'plane was in flight for a total of 225 hours, covering over 19,000 miles, without change of fabric.

Such a record was made possible only by the absolute protection given the dope and fabric by Valspar.

Valspar's durability is still further demonstrated by the fact that the machine remained out of doors every night except two from July 24th to November 9th.

Valspar's toughness, elasticity and waterproofness make it the one varnish that can be absolutely depended upon under all conditions of air service.





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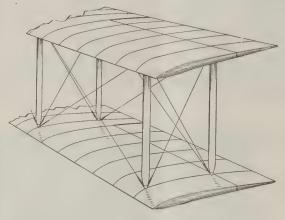
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# EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

# COMPARISON OF RESISTANCE AND WEIGHT OF K-BAR AND DOUBLE LIFT TRUSS SYSTEMS



The following is an exact Comparison of Resistance and Weight:

At a speed of 100 M.P.H.,
Wing loading of 9#/sq. ft.,
Safety factor of 8,
Aspect ratio of 6,
Gap/chord ratio of K-Bar Truss...1.143
Gap/chord ratio of Double Lift Truss...1.000

Normal C. P. near central wing bar, only light forces at most rearward C. P.

The K-bar Truss reduces interference by

eliminating interplane struts and wires and

also by affording increased Gap cord ratio.

Resistance of K-Bar Truss is  $\frac{97.2}{185.0} = 52.5\%$  of resistance of

Double Lift Truss.

EVERY FIRST (LASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

Weight of K-Bar Truss is  $\frac{106.45}{146.57}$  = 72.7% weight of Double Lift

### RESISTANCE AND WEIGHT OF K-BAR TRUSS SYSTEM

			Area				
Member	Size"	Length"	Sq. Ft.	Kx	No.	Rx#	Wt. #
Inner Panel Lift Wire	. 1/2	141	.49	.0026	2	25.4	19.1
Inner Panel Landing Wire	1,6	141	.306	.0026	2	15.9	9.55
Outer Panel Lift Wire	18	154	.334	.0026	2	17.3	10.4
Outer Panel Landing Wire	. I	154	.2	.0026	2	10.4	3.9
Inner Strut	. 2.64	96	1.76	.0004	2	14.1	31.0
Outer Strut	. 1.98	96	1.32	.0004	2	10.5	17.5
Inner Upper K-Bar			.34	.0004	2	2.7	1.7
Inner Lower K-Bar			.583	.0004	2	4.7	5.2
Outer Upper K-Bar			.243	.0004	2	1.9	1.7
Outer Lower K-Bar	. 1%	56	.535	.0004	2	4.3	6.4
					-		
						97.2	106.45

### RESISTANCE AND WEIGHT OF DOUBLE LIFT TRUSS SYSTEM

			Area				
Member	Size"	Length"	Sq. Ft.	Kx	No.	Rx#	Wt. #
Memper Rear Inner Panel Lift Wire Rear Inner Panel Landing Wire. Rear Outer Panel Lift Wire Rear Outer Panel Landing Wire. Front Inner Panel Landing Wire. Front Inner Panel Landing Wire. Front Outer Panel Landing Wire Inner Panel Inner Wire Front Outer Panel Landing Wire Inner Panel Inner Wire	1/2 to to 1/4 1/4 1/4 1/4 1/4	131	.455 .284 .318 .191 .398 .228 .256 .128 .166	.0026	No. 2 2 2 2 2 2 2 4	23.6 14.8 16.5 9.\$ 20.7 11.8 13.3 6.6 17.3	Wt. # 17.7 8.8 9.9 3.72 13.7 6.5 7.3 2.4 9.1
Outer Panel Inner Wire Rear Inner Strut Rear Outer Strut Front Inner Strut Front Outer Strut	. 2.42 . 1.74 . 2.29	84 84 84	.124 1.41 1.01 1.33 .96	.0004 .0004 .0004 .0004	2 2 2 -	12.9 11.3 8.1 10.6 7.6	1.8 22.8 11.8 20.5 10.5 146.57

NORMAL C.P. MOST REARWARD C.P. MOST FORWARD C.P. I DRIFT WIRE FROM LEADING EDGE BAR TO REAR WING TURNING THIS BAR ALTERS INCIDENCE OF UPPER PLANE BAR AEROFOIL-OFENSTEIN I SCALE FORCES EQUAL 3 FEET AND OPPOSITE NO BENDING MOMENT IN STRUT TURNING THIS BAR ALTERS LOW PLANE K-BAR CELLULE TRUSS

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(Continued from page 437)

owing to her small size, England is forced to utilize all the land available for the production of food."

The officials of the Aero Club of America and the Aerial

The officials of the Aero Club of America and the Aerial League of America were asked to comment on what appeared to be a calamity and they, with their usual foresight and good judgment, which has been the backbone of the Aeronautic Movement since 1905, when the Aero Club of America was organized, forecasted that this would make dirigibles available for commercial purposes and would lead to establishing permanent air lines and creating a large demand for dirigibles for commercial purposes.

Colonel Jefferson Du Mont Thompson, president of the club, pointed out that in the United States as soon as contracts for aeroplanes for the U. S. Army and Navy were discontinued and manufacturers turned to the civilian market they found the demand for aircraft for commercial use, pleasure and sport so large that they have not been able to meet more than a fraction of the demand.

Last year at this time most people thought it would take years before the demand for aircraft for civil purposes would be large enough to support the aeronautic industry. Today we find that the demand for aeroplanes for civilian purposes was larger than the manufacturers and dealers could meet.

Over 1000 planes have been bought during the past six months by individuals and as many have been ordered and the purchasers are awaiting delivery.

Messrs. Alan R. Hawley and Henry Woodhouse, who made a tour of the United States recently and a survey of the Aeronautic interests and demand for aircraft in 49 cities, expressed the same opinion as Colonel Thompson, and stated that now that the British Government has released the dirigible constructors, we shall soon see dirigible aerial transportation lines between England and the United States.

A few days later an Assoicated Press despatch from London was printed in the newspapers reading as follows:

A weekly airship service to America is contemplated by a combination of aviation firms, which are credited with the intention of acquiring the famous R-34 and her sister ship, the R-39.

These are being altered to meet passenger and cargo requirements.

# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington	350	miles
Washington to New York and return (four times)		miles
Washington to Macon and return Washington to Dayton and return	1260	miles
(two times)	1000	miles
Washington to Langley Field and		

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

# The Glenn L. Martin Company Cleveland

Contractors to the U. S. Army, Navy and Post Office Departments,

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FIRST IN PEACE

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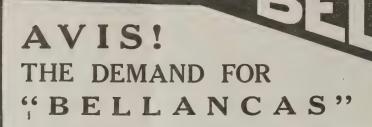
The great Trans-Continental Air Race represented millions of dollars worth of potential advertising. It was an augury of what is going to happen to-morrow on a commercial scale.

A big national advertiser will put one of the biggest advertising coups over when the first commercial liner jumps from New York to San Francisco, if he negotiates an arrangement to have a thousand aerial messages dropped over every important city enroute. We have scores of suggestions as to how this should be done, and we are closely in touch with the projected plans for Trans-Continental air trips, and the possibilities of utilizing them for aerial advertising.

Furthermore, there are scores of exhibition and passenger carrying services organized throughout the country that we can link up to your advertising department. Just tell us your business and we'll map your plan.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to Aerial Routes in the United States furnished on application.)



which occupies the entire time and attention of the personnel of our Aircraft Department engaged in manufacture and distribution, necessitates our regretfully foregoing representation at the Chicago Aero Show, which, together with every other factor advancing the good cause of American Aeronautics, has our sincere wishes for success.

MARYLAND PRESSED STEEL CO.

HAGERSTOWN, MD.

MARYLAND PRESSED STEEL CO. (AIRCRAFT DEPT. 299 MADISON AVENUE, NEW YORK CITY HARRY E. TUDOR, Sales Manager

.-Charles A. Okerland, president of the Jamestown Chamber of Commerce, and George F. Hulbert, proprietor of one of the large hotels here, assisted by Art B. Hickox of Buffalo, have examined a number of aerial landing fields near this city. Four of these are held under option, one of which will be selected for the municipal landing field. The one selected will be carefully graded, the prescribed markers placed and concrete runways constructed.

### English Company to Run Seaplane Service Between Bahamas and Florida

Washington.—An English aviation company known as the Bahamas and West Atlantic Avro Co., Ltd., has been incorporated recently under the laws of the Bahamas. The company plans to establish commercial and passenger flying between Nassau and Miami, Fla., and ultimately to extend the journey to other West Indian islands. It is expected that the regular service between Florida and the Bahamas will be established in January 1920, according to compare the commercial services of the commercial services o ary, 1920, according to announcement made by the Latin-American Division of the Bureau of Foreign and Domestic Commerce.

### Indianapolis Passes Drastic Aviation Ordinance

Indianapolis, Ind.—The Common Council has passed an ordinance through making it unlawful for aviators to fly over this city unless they are in the Government's service. The Council has not as yet indicated how the city will enforce

Jamestown, N. Y., Chamber of Commerce Secures Options for Landing Fields

Landing Fields

Landing Fields

Landing Fields

Landing Fields

Landing Fields tion to this drastic measure has been of-fered by aeronautic experts. Several cit-ies have passed ordinances prohibiting flying below 2,000 feet altitude and this is considered by experts to be an adequate

### Syracuse Wins in First Annual Syracuse-Rochester Derby

Rochester, N. Y.—Syracuse has won the first inter-city aerial derby ever staged in the United States, by defeating Rochester. The derby, promulgated by the Rochester and Syracuse Aero Clubs, is to be an annual affair between the two cities, and to the city winning the roce these and to the city winning the race three times in succession a trophy will be awarded by the Curtiss Aeroplane Company. Syracuse retained a leg on the cup at the race this week.

The individual honors of the day go to

Pilot Brewster, who made the best time

on the two laps between the cities, he covering the distance in 2:25 hours. He was closely pressed by Bjorklund, of Rochester, who negotiated the distance in 25 seconds more. To the best time for one lap, however, Bjorklund carries off the honors, making the ninety miles be the honors, making the ninety miles between the two cities in 1:03:25.

Both pairs of 'planes had planned to carry 150 pounds of freight each, but evidently the people in both towns failed to take advantage of the fact that things could be delivered by aeroplane for but little express was carried. In fact each

could be delivered by aeroplane for but little express was carried. In fact each aviator had to carry a passenger in order to make up for the 150 pounds allowed for in the 'plane.

Brewster, of Syracuse, came near losing his life on the first lap of the race when some water got into his carburetor and started to freeze. This was the only thing that bordered on an accident in the race. The time of the fliers:

The time of the fliers:

SYRACUS Left Syracuse Hood	Arrived Rochester	Left Rochester 1:08 P.M. 1:20	Arrived Syracuse 2:32:45 2:38
ROCHESTI	ER FLIERS	,	
Left Rochester Cane	Arrived	Left Syracuse 2:01 P.M. 2:01:35	Arrived Rochester 3:08 3:05
First Lap Cane 1:07 Hood 1:05:30 Bjorklund 1:22		Second Lap 1:18 1:07 1:24:45 1:03:25	Elapsed Time 2:25 2:30 2:30:15 2:25:25
Total elapsed time, Syracuse fliers, Total elapsed time, Rochester fliers	4:55:15. 4:55:25.		

# AERIX AGE WEEKLY

l. 10, No. 13

JANUARY 12, 1920

10 CENTS A COPY



Demonstrating the Possibility of Changing Passengers From An Aeroplane On Fire. Frank Clark Standing On Top of Plane Piloted by Howard Patterson Just Before Changing To Plane Above Piloted By Hal Wilson

United States to be Represented in Four International Aerial Contests



The Brewster-Goldsmith Corporation

33 Gold St., New York City, U. S. A.

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### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W. Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., January 12, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, JANUARY 12, 1920

NO. 13

### U.S. TO BE REPRESENTED IN FOUR INTERNATIONAL AERIAL CON-TESTS—AERO CLUB OF TEXAS NOTIFIES AERO CLUB OF AMERICA OF ENTRY IN GORDON-BENNETT CUP RACE —U. S. AVIATORS HAVE OPPORTUNITY COMPETE FOR \$2,000,000 IN PRIZES

HANKS to the energetic work of the Aero Club of America, the Aerial League of America and their affiliated organizations, the United States will be represented in the four annual international aeronautic contests.

The Aero Club of America has issued a call for airmen to represent the United States in the competition for the three

represent the United States in the competition for the three classic international aeronautic trophies, the Aviation Trophy, the Marine Trophy, the Balloon Trophy.

As the representative of the International Aeronautic Federation in the United States the Club selects the three pilots who are to represent Uncle Sam in these international contests in which the countries will enter their best pilots.

Mr. Augustus Post, the secretary of the Aero Club of America, who has just returned from Europe, where he went to attend the conference of the International Aeronautic Federation and to study the European aircraft situation, reported eration and to study the European aircraft situation, reported to Colonel Jefferson de Mont Thompson, the president of the Club, upon his return to this country, that the European coun-tries are determined to make every effort to capture these four prizes and will match our pilots and planes with their very best.

Since 1906, when the first international balloon race was held, America has been in the lead in the number of international races won, but we made a poor showing in the Marine Flying Contest and in the last two aviation trophy contests, and unless we select the best pilots and planes our leadership in aerial sports will pass to other countries.
"The European countries are keen for the revival of pre-

war aerial sports and the coming contests will bring out the latest developments in aeronautics and the last word in expert airmanship," said Mr. Alan R. Hawley, chairman of the Contest Committee of the Club, and who, it will be recalled, won the International Balloon Race for America in 1910.

"We are asking the aero clubs affiliated with the Aero Club

of America whether they prefer to have the entries for the international contests selected by national elimination races, the winners of which will represent the United States in the international races.'

The following countries are expected to send representatives to the international trophies contest: Belgium, France, Great Britain, Italy, Japan, the Netherlands, Norway, Switzerland, Sweden, United States, Brazil, Argentine, Chile and Cuba.

### International Balloon Contest to Be Held in the United States, 1920

The International Balloon Contests are to be held in the

United States in 1920. The representatives of the Aero Club of America have won four contests out of eight, as follows: 1905: Won with balloon "United States," piloted by Lieutenant Frank P. Lahm (now colonel). Started from Paris, crossed English Channel, landed in England, 410 miles from starting point. starting point.

1910: Won with "America II," piloted by Alan R. Hawley and Augustus Post, aide. Started from St. Louis, landed north of Lake Sotogama, about 50 miles from St. Ambrose,

north of Lake Sotogama, about 50 miles from St. Ambrose, Canada, 1,172 miles from starting point. "After forty-six hours in the air Messrs. Hawley and Post were lost in the wilds of Canada for a week before they found their way out. 1913: Won with balloon "Goodyear," piloted by Ralph H. Upson, with R. A. D. Preston as aide. Started from Paris, crossed the English Channel and landed on the Yorkshire coast, about 400 miles from Paris, after forty-three hours and twenty minutes in the air. twenty minutes in the air.

The Aero Club of America will decide in the near future at which city the next international balloon race is to be held and will select the three pilots who will represent the United States in this historic contest.

As the club has granted 850 balloon pilot certificates in the United States during the past two years, it will not be difficult to find pilots.

### 1920 International Seaplane Contest to Be Held in Italy

The 1920 contest for the International Seaplane Trophy and \$5,000 prize will be held in Italy. The first contest held in 1913 was won by the representatives of the Royal Aero Club of Great Britain. No contests could be held during the war. The The second contest was held at Bournemouth this year. The entry of the Aero Club of Italy was the only one to complete the twelve laps, but owing to the fog he mistook a boat carrying spectators for the control boat, and was disqualified.

At the request of the British delegates the Federation awarded the Aero Club of Italy the privilege of organizing the contest for this trophy in Italy in 1920.

The Aero Club of America will select the three pilots who will represent the United States in this contest.

### The 1920 International Aviation Trophy

The 1920 International Aviation Trophy is to be competed for in France. The rules and regulations are to be decided by the F. A. I. in the near future.

The Aero Club of America will select the three pilots out of the 4,800 Americans who have been granted F. A. I. certificates by the Club who will go to France to represent the United States in this classic contest, which was twice out of five times in the past won by representatives of the Aero Club of America, as follows:

1909: Won by Glenn H. Curtiss, at Rheims, France, covering twenty kilometers at a speed of 46 miles per hour.

1911: Won by C. T. Weyman, at England, flying a 100 h.p. monoplane, covering 150 kilometers at a speed of 78.05 miles. France has won the trophy twice in succession and will hold the trophy if she wins it this year. Every effort will be made, therefore, by the different countries to win it this year.

Aero Club of Texas Enters for Gordon Bennett Aviation

Trophy

Mr. C. Anderson Wright, president of the Aero Club of Texas, has advised the Aero Club of America that a formal entry has been made on behalf of the Aero Club of Texas, the machine to be used being kept secret, and that no expense will be spared to win the Trophy for Texas!

### Second Monaco Seaplane Races

The second Monaco seaplane race is to be held from April 18th to May 2d. America was represented in the first rally by

William Thaw (now colonel) and Alexander Blair Thaw. Twenty-five thousand dollars in prizes are offered for the next contest.

American aviators will have opportunities to compete for over \$2,000,000 in prizes in contests to be held under the rules of the International Aeronautic Federation, announced in the

last number of AERIAL AGE.

Only aviators holding the International pilot certificate, issued in the United States by the Aero Club of America, can participate in these contests, information regarding which can be obtained from the Aero Club of America, 297 Madison Avenue, New York City.

### SECRETARY DANIELS PROTESTS TO HOUSE COMMITTEE ON MILITARY AFFAIRS AND SECRETARY BAKER AGAINST ASSERTIONS OF ARMY OFFICERS

CECRETARY DANIELS has taken exception to statements made by a number of army officers before the Subcommittee on Aeronautics of the House Committee on Military tee on Aeronautics of the House Committee on Military Affairs which, he states, were unfounded and erroneous. He has written a letter to Representative Anthony, acting chairman of the House Committee on Military Affairs, requesting that the Navy be heard by the House Subcommittee on Aviation. With this Secretary Daniels also sent to Mr. Anthony a copy of a letter he had forwarded on the previous day to Secretary of War Baker regarding certain evidence given before the House Subcommittee on Aviation by three officers of the Army and requested that this be printed in the record of the subcommittee's hearings.

subcommittee's hearings.

In the letter to Mr. Anthony Mr. Daniels called attention to the fact that during the hearings of the House Subcommittee on the establishment of a separate Air Service "a great deal of evidence has been introduced as to the Navy's requirements and views. But little of this evidence, however, was obtained from naval officers, regardless of the fact that the subject is the Navy and the hearings evidence of the subject is the Navy and the hearings evidence of the subject is the Navy and the hearings evidence. one of vital interest to the Navy, and the hearings are quite incomplete as regards it." He continued: "I have to request that before the matter be considered as closed by your committee, the Navy be given ample opportunity to present is views upon the subject now under discussion." Mr. Daniels then called attention to the letter to Mr. Baker he enclosed "regarding certain evidence given before your committee during the month of October on this same subject by certain officers of the Army who through ignorance of the Navy gave the committee information which was erroneous.'

Secretary Daniels' Letter to Secretary Baker Secretary Daniels' letter reads in part as follows: My dear Mr. Secretary:

On October 7th last Brigadier General Mitchell, Col. C. DeF. Chandler and Major F. D. Foulois appeared before the Committee on Military Affairs of the House of Representatives. These officers made certain statements concerning Naval Aviation, covering matters which it seems to me had better have been discussed by those more conversant with the Navy than apparently were these gentlemen. On page 909 of his hearings, General Mitchell is quoted as

follows:

"I think the flying personnel of Naval Aviation are really in favor of it (meaning a separate air service), but hesitate to express their opinions because they are all junior officers and because the senior officers are against the subit largely, I believe, from lack of familiarity with the sub-

This reply is simply an expression of opinion on the part of General Mitchell which, however, is incorrect. The majority of the naval aviators of the regular navy are united in opposition to the United Air Service as has been proposed, which is considered to be fallacious in conception and hence unworkable in practice.

On page 909 General Mitchell quotes an interoffice order by Admiral Benson, the subject of which was "The Discontinuance of Aviation Division." The General states that this order discontinued the Naval Aviation Division and distributed the work among various departments in and distributed the work among various departments in the Navy and that it ceased to exist as an arm. This statement shows General Mitchell's unfamiliarity with the Navy Department organization. There never has been a separate Air Service in the Navy. The order of the Chief of Naval Operations made a redistribution of the duties carried on in the Office of Operations and did not decrease. with Aviation as an arm of the Navy or in any way change what had been the functions of the different bureaus of the Navy Department. On page 911 General Mitchell states as follows:

"One thing we have not done is to develop any lighter-than-air machines; that is, rigid dirigibles. I think that is very important, and we have attempted very strenuously lately, with the help of the War Department, to get the L-72, which is in Germany, and which is the last word in dirigibles. Colonel Chandler just showed me a cablegram from Paris stating that he could not get that ship on according to the could not get that ship on according the could not get that ship on according the could not get that ship on according to the could not get that ship on according the could not get that ship on according the could not get that ship on according to the could not get that ship on according to the could not get that ship on according to the could not get that ship on according to the could not get the could not get that ship on according to the could not get the c from Paris stating that he could not get that ship on account of the distribution of German aircraft agreed to by

the Allies."

The activities here revealed are in direct opposition to the approved policy as agreed upon between the War and the Navy Departments by which both services are to avoid duplication of effort and expense. The Navy has one rigid airship under construction in the United States, and is negotiating for the purchase of another in England. Individual efforts repudiating the approved policies of the Devictor. vidual efforts repudiating the approved policies of the Departments of the Government cannot fail to be embarrassing, and such, if tolerated, can be made to supply evidence of a lack of co-operation to be used by those agitating in favor of the creation of a new Department of the Government.

ernment.

On page 953 of the reference it would almost appear that the details of the campaign in France were built around the plans of Major Foulois. In the remarks of the latter he states that he learned by accident that the Navy was starting in Paris a separate bombing offensive against the enemy submarine bases. Major Foulois was kept informed, as far as it was possible, as to what the Navy was doing, and the final settlement of any misunderstanding between the Army and the Navy was entirely satisfactory to General Pershing, for he informed Captain Cone to that effect.

Page 954 Major Foulois states: "The plans for the in-

Page 954 Major Foulois states: "The plans for the independent operation of Navy aero squadrons on land type dependent operation of Navy aero squadrons on land type aeroplanes, and from land bases on the Western front in France, were entirely contradictory to the policies of the Commander-in-Chief of the American Expeditionary Forces in Europe. These naval units ought normally to have been ordered to report to the Commander-in-Chief of the American Expeditionary Forces for duty and for assignment to such air duties as the existing military conditions, may have dictated instead of undertaking index ditions may have dictated, instead of undertaking independent operations in territory over which the Commander-in-Chief of the American Expeditionary Forces exercised control of all American forces."

The naval operations against German submarine bases in Belgium from a base in France were planned with the advice and assistance of the War Department in Washington and A. E. F. headquarters in France was informed of

this decision.

Page 955, the Chairman: "Do you know whether the Navy has any dirigible?" Major Foulois: "I do not think they have at the present time." Colonel Chandler: "They have a small one."

The answer: "They have a small one," is entirely incor-

rect and misleading.

The Navy, previous to the entrance of the United States The Navy, previous to the entrance of the United States into the war, had pushed the design of the small Blimp which had been successful in submarine patrol, and soon after war was declared Navy personnel was flying these blimps. They were never sent abroad, but they did excellent work along our own coast. During the war a very successful twin-motored airship was designed by the Navy and made its appearance soon after the armistice was signed. This ship, the "C" Class, is one of the fastest of its size in the world, and the trip of the C-5 from Montauk to St. Johns is proof enough of its cruising radius. The Navy has, at the present time, twelve single-motored airships, some of the present time, twelve single-motored airships, some of (Continued on page 496)



# THE NEWS OF THE WEEK



### Mail Pilot Flies 215 Miles in 83 Minutes

records Washington.—All American for a non-stop flight of more than 200 miles are believed by Post Office Department officials to have been broken on January 2 by James H. Knight, an aero mail pilot, who flew with a load of mail from Cleveland to Bellefonte, Pa., a distance of 215 miles, in 83 minutes.

The flight was made at an average of

156 miles an hour and was seven min-utes better than a similar trip made by Knight last September.

The start from Cleveland was made in

a raging snowstorm.

### British Enters Transpacific Air Race

Los Angeles.—Captain Sir Arthur Whitten Brown, who navigated an aero-plane across the Atlantic in the first nonstop trans-ocean flight, has entered a Vickers-Vimy plane in the proposed Transpacific flight, for which Thomas H. Ince has offered a prize of \$50,000. Captain Brown made his entry in person with Mr. Ince at the Ince studios here.

He stated that the plane is being boxed for shipment at Venice, Calif., from which point he expects to make his hop-

off.

### Kelly Field Entertains Major Takagi, Japanese Attache

Major S. Takagi of the Japanese Army has been a constant visitor at Kelly Field,

Texas, for the past three weeks and has been given every opportunity to study methods of Operation, Training and Supply.

Major Takagi is attached to the Japanese Embassy in Washington. He is a veteran of the Russian-Japanese war, and is an officer in the Imperial Japanese Engineer Corps. His special mission was to study our methods of Training and Field Construction for Japan has recently appropriated a huge sum of money for its Air Service, and the major will probably have charge of the construction of Japanese Air Service Schools.

After finishing with his course of study at Kelly Field, Major Takagi inspected the Aviation General Supply Depot and Brooks Field.

### French Adjust Aero Suits

Paris.—French aeroplane companies have settled suits brought against them by the Wright Company of America, which alleged that the companies had violated fundamental patents governing the construction of flying machines owned by the Wright corporation.

Infringements on the patents occurred during the war, it was asserted, and the Wright Company brought suits for amounts aggregating about \$10,000,000.

### Toronto Wants Aerodrome

Toronto.—According to Mayor Church practically every city in Canada has selected a site and is laying out its civic

### I. A. Standards Commission

A joint resolution introduced in the House of Representatives authorizes the President to appoint delegates to the International Aircraft Standards Commission and appropriates \$6,000 for ex-

Doctor Uses Plane to Aid Sick Family

Harrisburg, Pa.—An aviator from the Middletown, Pa., aviation reserve depot recently took a doctor by aeroplane to give medical aid to the family of John Pfaunmiller, a farmer on Duffy's Island in the Susquehanna, cut off by ice from the shore. Word had reached the depot that three children in the family were ill with pneumonia.

Two weeks ago the same aviator took doctor over a river filled with ice to Hill Island, where a boy had been hurt by

a falling tree.

# Japan Welcomes American Commission Organizing First Aerial Derby Around the World

That the Aerial Derby Around the World will be an important factor in promoting peace, is the opinion of leading



Japanese statesmen which have been received by the Aero Club of American and the Aerial League of America.

Official Japan gave a most hearty reception to Commodore Louis D. Beaumont, Major Charles J. Glidden and Ben Hillman, who form the commission appointed by the Aero Club of America and the Aerial League of America going to 32 countries around the world organizing the Derby. Ten Japanese entries have been assured with \$100,000 in prizes.

Following are a few of the expressions of hearty appreciation from leading statesmen and Japanese officials, of the importance of the Derby as a factor to promote international peace:

mportane of the Detay as a tactor to promote international peace:

Marquis Okuma, formerly premier of the Empire and president of the Imperial Aviation Society of Japan, said: "The success of your mission means for perpetual peace to the world."

Viscount K. Kaneko, His Majesty's Privy Counselor, said: "The commission is sowing the seed of international friendship upon the entire world, and you are doing a noble, wonderful and magnanimous work."

Baron Y. Sakatani, formerly Minister of Finance and vice-president of the Imperial Aviation Society of Japan, said: "I know America well and that America is great in many things, but the organiza-

is great in many things, but the organization of the First Aerial Derby Around the World is the greatest of all as it will bring the people of all lands closer to-gether and makes for perpetual peace." Major General I. Inouye, chief of the Japanese Air Service, said: "Commodore

Perry opened the door of Japan to the world. The Aerial Derby Around the World has opened the door of Japan to

Mr. E. W. Frazar, special commissioner for Japan and Corea, said: "The true dove of peace is the aeroplane."

### The Prince of Wales Elected to the Aero Club of America

The Aero Club of America has been honored by receiving a letter from His Royal Highness the Prince of Wales most graciously accepting his election as an Honorary Member of the Aero Club, which was tendered to him during his recent visit to the United States.

The letter received is as follows:



Ethel Munn, the first aviatrice to transfer from one aeroplane to another while in flight

16th December, 1919 Sir: St. James Palace, S. W. I am desired by the Prince of Wales to acknowledge the receipt of your letter of the 26th ultimo and to ask you to convey to the Officers, Governors and Members of the Aero Club of America His Royal Highness hopes that when he next visits fact that they have elected him as an Hon-orary Member of the Club. His Royal Highness hopes that when he next visits the United States he may have longer in New York and will find an opportunity of meeting his fellow members.

I am, Sir, Your obedient servant, Godfrey Thomas, Private Secretary. (Signed)

### Newport News Aero Club Formed

Under the presidency of D. H. Robinson, the Newport News Aero Club was organized with the purpose of establishing a flying field at the small boat harbor for the accommodation of transient flyers, instruction in aviation, passenger carrying and the conduct of a general business of repairing and overhauling planes and motors. Work is now being carried on in

the construction of the first of several hangars which are to be erected on the field, while the surface of the field is being prepared for the landing of planes, Ten Curtiss machines have been bought by the club and will be shipped as soon as there is hangar accommodation at the field to receive them.

# Results of Curtiss Marine Flying Trophy and \$1,000 Prize in Doubt

Lieut. David H. McCulloch, who piloted one of the N. C. seaplanes across the Atlantic last May, and Syd Chaplin, of Movies fame, are among those who completed for the Curtiss Marine Flying Trophy and \$1,000 prize, the contest for which closed at sundown on December 31.

Under the rules of the contest the Officer the rules of the contest the \$1,000 prize goes to the aviator, member of the Aero Club of America, or an organization affiliated with the Club, who has made the largest flight between sunrise and sunset of one day in a seaplane, flying between two points. Five per cent. is deducted for every stop made during the flight and five per cent, added for every passenger carried on the flight.

The telegraphic report seems to show a tie, and as the report seems to snow a tie, and as the reports of other contestants may be on their way to the Club by mail the Contest Committee of the Aero Club of America, which awards the \$1,000 prize, will wait until all the detailed reports of the contest are at hand before making the award.

According to telegraphic reports David H. McCulloch, competed for the Curtiss Marine Flying Trophy on December 31. He flew for nine hours and thirty-one minutes in a Curtiss flying boat covering a distance of six hundred and seventy miles. The report does not state whether they are statute or nautical miles and is not clear as to the number of passengers carried. The telegram read: "Carried mechanician Christensen as passenger whose flight carried two extra passengers last round trip one landing made ten miles north Miami to replenish oil other landing made before last round trip to

other of this flight is sending to the Contest Committee a detailed report of the flight with charts showing the distances and places where stops are made tances and places where stops are made, on which the Committee will compute the

on which the Committee win compute the distance covered.

The flight took place between North Bridge, Palm Beach and Miami Drive, Miami, the distance between points being sixty-seven miles. McCulloch started at 8.32 A.M. and ended at 6.10 P.M. A fifteen miles west, north west wind was blowing.

Lieut. A. C. Burns, U. S. Navy Reserve piloted the M. F. flying boat entered by the Sid Chaplin Aircraft Corporation of Los Angeles, Calif., which, according to telegraphic reports a distance of 650 nautical miles carrying one passenger.

According to telegraphic reports they started from San Pedro, California, at 7.02 A.M. and flew until 5.02 P.M. making four stops totaling fifty minutes, so that the actual flying time was nine hours and ten minutes.

Ensign K. A. Drager, U. S. N. and Gunner Richardson, U. S. N., observed the flight and are sending to the Contest Committee a detailed report of the flight,

with charts showing distances, etc.

Officers at various Naval stations planned to compete for this prize and officers were appointed to observe the flights. So it is possible reports of other flights besides the above will be received during the part form days. during the next few days.



Santa Claus landing from a balloon at Fort Omaha Balloon School. Col. Jacob Wuest, com-mandant of the school, and Leo Stevens. chief aeronaut of the school, are seen welcoming the Christmas visitor



### Aeronautical Concern to Erect Large Plant in Newark

Involving the establishment of a new industry in this city and eventually the erection of a million-dollar plant and the employment of about 1,000 hands the Wright Aeronautical Corporation of America has purchased from the Merchants' National Bank a tract of five and a half acres at Frelinghuysen and Meeker Avenues. While no definite plans of development have been made, it was stated that the first unit of the projected plant would be a building to contain 100,000 square feet of floor area. It will be used for the manufacture of motors and planes. An office building will also be erected. It is expected to start the construction work next month.

The corporation is allied with the Wright-Martin Aircraft Company, which has disposed of its New Brunswick plant to the International Motors Corporation. The managing directors are the G. W. Goethals Company. Connected with the concern is H. M. Crane, designer of the Simplex Automobile Company, while G. H. Houston is president and F. B. Rentchler is vice-president and general

manager.

### "There's Money In the Air"

Aviation has furnished many new occupations, but none are proving profitable as passenger-carrying and aerial advertising. The Curtiss Company is daily in receipt of letters from former air service pilots who are using their flying knowledge to advantage. Only recently, J. J. Privette, Jr., one of the members of the Bishop-Privette Aerial Company, was in New York after a five months' tour of the South. Mr. Privette, who is using four Curtiss JN-4D's, states that there is a big field in aerial advertising.

He said that, on Armistice Day, in a North Carolina town of 6,000 inhabitants, his company took in more than \$1,000 in a single day. This income was equally divided between aerial advertising and passenger-carrying. His pilots have carried hundreds of people and during the entire period no difficulty has been experienced with either planes or motors.

The Bishop-Privette Company carries a staff of seven men, including four pilots and three machanics. Milburn Bishop, chief pilot, has an interesting war record, having spent eighteen months abroad. He has three Hun planes to his credit and was decorated with the Croix de Guerre.

The headquarters of the company are located at Wilson, North Carolina. Operations during the winter months will be carried on at Atlantic Beach, near

Jacksonville, Fla.

Another letter has been received from Fred Hoyt, former instructor at March Field, who, since his discharge from the aviation service, has been operating a Curtiss JN in Washington and Oregon. "We did exhibition work at most of the county fairs," said Hoyt, "and carried passengers galore at \$15 and \$20 a throw. Did some advertising work and carried express for a while. Hoyt says that the big drawback in those two states is the lack of adequate landing facilities.

### Crawford Aeroplane Co. Develops Small Single Seater

Venice, Cal.—The Crawford Aeroplane Company of this city has completed an experimental single-seater plane, designed by C. O. Prest. The general dimensions are: Span, 18 feet; length overall, 14½ feet; weight, empty, 600 pounds; motor, 50 h.p. Gyro; loading, 6.25 pounds per square foot, 15 pounds per horsepower; high speed, 100 m.p.h.; landing speed, 45

m.p.h. The thrust of 400 pounds takes the machine off the ground in 100 feet and climbs 1,400 feet the first minute. The actual ceiling has not been determined as yet. The top plane is straight and the lower plane is set at a dihedral of 2 degrees. Top plane at an angle of 4 degrees and lower at an angle of 3½ degrees incidence. The stagger is 19 inches.

The sides of the fuselage in the motor section and the bottom to the back of the pilot's seat is covered with three-ply birch veneer, forming in the latter case the floor also and doing away with cross wires in these sections.

The main beams are of spruce ribs of lightened three-ply birch, the wing curve being a slightly altered U. S. A. 4. The factor of safety in the wings and wiring is 20 to 1. All the struts, as well as the landing gear, are of steel tubing. The landing gear being rigid, with no shock absorbers whatever other than the tires of the  $20 \times 4$  inch wheels. Dep control is used.

Techno-Chemical Receipt Book. By Brannt-Wahl. 512 pages, 78 illustrations

A compendium of practical and scientific information, containing thousands of receipts covering the latest and most useful discoveries in chemical technology and their practical application in the useful arts and industries. Although the book covers an extremely diversified series of formulas and receipts, a good deal of material in several sections is applicable to the aircraft industry, including those on paints and varnishes, fabrics, electro-plating, enamelling, fire extinguishers, glue, solders and soldering alloys, etc., etc. Procurable at the Aeronautic Library, Inc., 299 Madison Avenue, New York.

Start of aerial delivery service at Mobile, Ala. Mr. J. B. R. Verplanck, pioneer aerial tourist, who bought a flying boat in 1913 and made an aerial cruise of the Great Lakes with Becky Havens that year, has bought two Curtiss F boats and has established winter headquarters at Belview Bellair, Florida, with a school and passenger carrying service. Both Mr. Verplanck and Mr. Wheeler are members of the Aero Club of America



Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
gene Sibley, Operator in Charge Radio Maintenance a
Operation Eugene



PILOTS

John M. Miller Lawton V. Smith Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader Charles I, Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Navark Warchouse Victor W. Fitch, Manager, Newark Warehouse

Samuel C, Eaton Robert H, Ellis James H, Knight Elmer G, Leonhardt Paul S, Oakes Paul W, Smith Frederick A, Robinson Max Miller F, A, Nutter

### Mail Pilots Fly at 25 Below Zero

The aerial mail of the United States has recently been carried on time to its destination through driving snow and piercing gales in a temperature of 25 degrees below zero. So cold were the upper regions of the air that ice formed on the inside of the pilot's goggles.

Despite this, the zero weather was but an incident to the pilots, who maintain their aerial schedules each day with the regularity of a railroad time table.

### Martin Bombers for Aero Mail Service

Washington.—Several big twin motored Martin bombing planes are soon to be put into operation by the Aerial Mail Service on the New York-Cleveland-Chicago

These giant planes, adapted to the needs of the mail service, have been undergoing tests at Cleveland for some time. of the big planes are being assembled at the New Jersey aero mail field near Newark.

### Parachute Soon to Deliver U. S. Mail

Parachutes to be used in the delivery of mail from aeroplanes now are being manufactured in Philadelphia and soon will be ready for experiments to be made by the Postoffice Department. Upon the success of these experiments depends the possibility of obtaining aero-mail service for Baltimore, according to Otto Praeger, Second Assistant Postmaster General.

Mr. Praeger sees At present chance of Baltimore having air service for mail which originates in that city. It has been found, he said, that it is not possible to operate aero-mail lines economically on jumps of less than 200

The plan of dropping mail by parachute has been considered by the Postoffice Defor some time and has been tried with some success. Experiments recently made in Washington showed that the mail could be dropped with no injury, eggs having been cast from an aeroplane postoffice officials were enthusiastic over the success had with these experiments and immediately ordered six parachutes without the loss of one of them. The for further trial.

### Airmen Carry Mails Through Snow Storm

Aeromail flyers on all routes forced to carry the mail through blinding snowstorms December 7.

A big Martin bombing plane piloted by Capt. Walter H. Stevens carried the mail out of Washington at 11:30 o'clock while the storm was at its height. With both motors roaring the big plane rose from the snow-covered field, and in two minutes had entirely disappeared in the swirling snow.

The plane carried 1,068 pounds of mail. Victor Mane was aboard as mechanic.

The southbound mail left New York at 9 o'clock in a Curtiss R4, piloted by E. Hamilton Lee. Lee passed over E. Hamilton Lee. Lee passed over Bustleton at 10:05. He was flying at a low altitude, and his speed was cut down by cross winds.

Lee landed at College Park at 11:35 o'clock. He reported heavy snows and constant side winds. The flight from New York took 2 hours, 45 minutes, and he carried 340 pounds of mail.

### CONSOLIDATED STATEMENT OF OPERATIONS OF AIR MAIL SERVICE, JULY 1, 1918, TO JULY 1, 1919

	Trips	Trips	Trips	Weather E	ncountered	Mileage	Miles	Percent of Per-	Mails Carried	Cost of		Landings e to:
Month	Possible	Attempted		Trips in Fog, Etc.	Trips Clear	Possible	Traveled	formance	(Pounds)	Service	Motor	Weather
1918												
July	108	106	2	. 41	67	12,150	11,855	97 - 57	16,967	\$10,001.46	4	4
August	100	109	0	17	92	11,988	11,984	99.96	16,588	9,555.67	I	I
September.	100	100	0	36	64	10,900	10,900	100.00	15,200	9,638.74	2	ı
October	108	108	0	24	84	11,772	11,617	98.68	16,788	9,841.76	2	0
November.	104	102	2	24	80	11,336	11,118	98.07	16,854	10,673.68	0	I
December.	104	91	13	50	54	10,896	8,415	77.23	17,778	13,300.46	7	II
January	108	92	16	53	55	11,772	9,653	82.00	18,105	13,741.58	1	5
February	97	92	5	42	55	10,554	9,307	88.18	15,489	13,645.16	6	5 8
March	106	102	4	34	70	11,554	10,699	92.59	17,531	13,880.29	5	5
April	107	105	2	32	75	11,682	11,105	95.06	16,677	13,516.44	2	7
May	160	156	4	70	86	23,296	22,578	96.92	26,627	17,715.66	2	6
June	224	2:4	0	88	136	30,943	30,835	99.53	35,647	30,891.62	4	4
Totals	1,435	1,,87	48	511	918	166,843	160,066	96.54	230,251	\$166,402.52	36	53

# THE WESTLAND LIMOUSINE

THE first "Westland Limousine," was designed in January, 1919, and flown on July 12th, 1919. From the very first flight the machine proved most satisfactory, and on account of the great care taken in streamlining the body, a higher speed was obtained than with previous machines of similar horsepower.

During the British railway strike of October, 1919, a Westland Limousine was employed in carrying mails for the Government, and during the week flew 1,000 miles without the slightest trouble. A good deal of this was done in very bad

weather.

Safety, speed, reliability and comfort are essentials of the and last, but by no means least, great simplicity has been achieved.

### General Description

For passenger work three people in addition to the pilot are carried, all of them being totally enclosed in a com-fortable cabin upholstered after the best motor car practice.

Entry to the cabin is made by a door on the starboard side. It is as easy to step in and out of, as a limousine car. Facing the door is the pilot's cockpit with his seat and controls raised on a little platform. This lifts the pilot sufficiently high

raised on a little platform. This litts the pilot sufficiently high for his head to project through the roof of the cabin, giving him an excellent all round view, while at the same time he is in direct verbal communication with the passengers. By the side of the pilot, but slightly below him is a comfortable bucket-shaped seat giving an easy position and a splendid view through the large triplex glass window on the right. In front of the pilot's cockpit is the cabin proper, with two seats facing fore and aft respectively.

The whole cabin is heavily padded right up to the roof, and

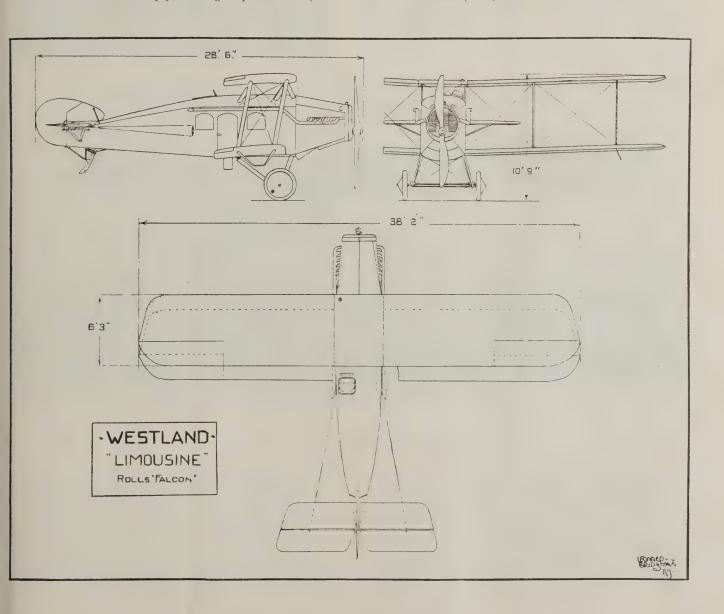
The whole cabin is heavily padded right up to the roof, and

this very effectively damps out the noise; conversation can be carried on in comfort. In this connection, an interesting experiment was carried out recently. A typewriter was installed in the machine and while traveling at 100 m.p.h. our commercial manager dictated letters to his secretary, who took them down in shorthand and typed them without the slightest difficulty, effectually proving the steadiness of the machine and absence of vibration and noise.

The Westland Limousine has a maximum speed at 1,000 feet above sea level of 115 m.p.h. and an average touring speed of 85/90 m.p.h., which makes for economy in running costs, as at this speed the engine is well throttled down. With full load the machine will climb 1,000 feet in the first minute, which gives ample margin for clearing obstacles round

the aerodrome when taking off.

	G	
Weight (fully loa	aded)	3,560 lbs.
	Ailerons and C Sections)	435 sq. ft.
Loading, per sq.	ft	8.2 lbs.
	Bottom Planes)	38′ 2″
Height over all		10′ 9″
Length "		28' 6"
Gap		6' 0"
	Bottom Planes)	6' 3"
		12"
		2°
Dihedral		21/2°
Area of Tail Pla	nne	30.4 sq. ft.
" " Elevator	rs	23.7 *"
" · · · Fin		6.0 "
		11.3 "
" " Aileron	(each)	15.6 "
" " Aileron	(total)	62.5 "
2 211 011	(	



Propeller (4 bladed) Petrol Capacity..... Oil Capacity... 6 miles per gal. Petrol Consumption....

Engine: 275 horsepower, Falcon III, Rolls-Royce. Fitted with two 12-cylinder B. T. H. magnetos and low compression pistons. The fuselage is built up of three separate and easily detachable units:—The engine mounting; the cabin; the rear portion of the fuselage.

The engine mounting is of rigid tubular construction, and owing to the width of the fuselage all members are well

triangulated and a very rigid structure obtained.

The cabin is built up of spruce lattice girders with 3-ply wood, glued and screwed to each side, thus each side of the cabin is virtually a deep section self-contained girder of great strength. The inside is free from any obstructions.

The rear portion of the fuselage is of the usual girder type and fixed to the cabin by channel plates and bolts.

Undercarriage: Of high tensile steel tube, streamlined with wooden fairing.

Variable Tail: The tail incidence can be varied from the pilot's seat. The gear is of simple patented construction, very free in action and irreversible.

Starting up: Auxiliary main switches, starting magneto and priming pump are situated in the engine cowling, and the pilot can easily start up his engine without any assistance whatever.

The usual standard instruments are fitted, and great care The usual standard instruments are fitted, and great care has been taken to make the petrol system absolutely reliable. The main tank feeds the carburetor under slight air pressure, which is kept up by windmill pump or auxiliary hand pump. The gravity tank, holding 6 gallons, is incorporated in the top plane. Should the main pressure system fail, a Vickers hand pump is provided by the side of the pilot whereby the gravity tank can be kept full of petrol by pumping it direct from the main tank, thus allowing the machine to run on indefinitely and not be forced to descend owing to the gravity. definitely and not be forced to descend owing to the gravity tank becoming empty.



Interior view



The Westland Limousine

(Continued from page 490)

which are old in service, seven twin-motored airships built and three building. All of these are purely naval in design. The Navy has also the following foreign ships: One new Italian semi-rigid; one old British Zero, one new British North Sea; one new French Zodiac gun carrier, one new French Chalais Meudon building in France. The following ships which have been used by the Navy in actual war operations in France: Two old Zodiac Vedettes, one Astra Torres gun carrier one Chalais Meudon dettes, one Astra Torres gun carrier, one Chalais Meudon, and one Astra Torres. The Navy has turned over to the

Army one new French Zodiac gun carrier, one new Astra Army one new French Zodiac gun carrier, one new Astra Torres gun carrier, and one C Class, and has guaranteed the delivery of two Navy "D" Class as soon as the latter have been tested. Insinuation as to the lack of co-operation cannot be understood. The Navy has trained many of the Army airship pilots, and as noted above supplied and is supplying airships to Colonel Chandler's department. Page 985, Major Foulois: "I brought the question up the other day with Colonel Chandler and asked him what information he was getting from the Navy and he said

information he was getting from the Navy, and he said

(Continued on page 499)

# A NEW PROCESS FOR THE PRODUCTION OF AIR CRAFT ENGINE FUELS

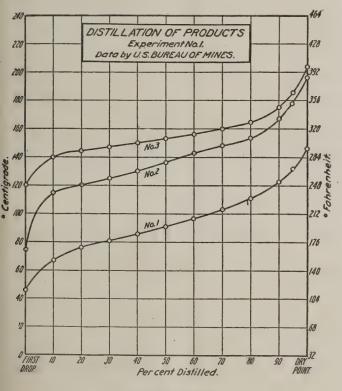
By AUGUSTE JEAN PARIS, Jr., and W. FRANCKLYN PARIS

### Introduction

HE main object for which these experiments were conducted was the development of a new method of producing high-grade aviation gasoline. Of almost equal importance was the problem of increasing the yield over existing practice, and also of reducing the cost of production. The experimental plant was established at Charleston, W. Va., and owes its origin to the offer made to the Government during 1917 and accepted by the National Advisory Committee for Aeronautics early in 1918 for the erection of a test laboratory.

a test laboratory

The installation consisted of a suitable building and equipment, including a six-horepower "Foos" gas engine, a 2-ton Brunswick ammonia compressor, high-pressure tanks, condensers, separators, pressure gauges, etc., which, together with our services, were offered to the Government without remuneration. remuneration.



### Present Methods

The universal method of producing gasoline consists of boiling crude oil in a still, similar to the boiling of water in a kettle, the vapor arising from the oil being passed through a condenser, which consists of a series of pipes lying in a trough of moving water, the water playing the part of cooling the oil vapors, and thus condensing them into liquid which is removed to a cleaning outfit where it is treated with sulphric acid to remove the unsaturated or cracked products. Sulphuric acid has a great affinity for cracked paraffins such as are produced in gasoline distillation.

The temperature at which the first drop of gasoline condenses from the distillation of crude oil differs according to the age of the oil field from which the crude oil has been obtained, and also according to the length of time it has stood uncovered since its pumping from the well. Crude oil from the Pennsylvania or West Virginia fields will start to boil at 80° F, to 100° F; and the first drop of condensation will be found at about that temperature. This is known as

the initial boiling point.

The temperature of the still is then gradually raised until it reaches the temperature at which it is desired to "cut" off the distillate. This is known as the end point or final boiling point. This latter temperature is controlled by the commercial side of the enterprise, i.e., the supply and demand for gasoline. At 302° F. as a final boiling or end point the end of the

real volatile products is reached, and they are about to enter the illuminating or burning oil distillates. Most of the commercial gasolines have and end point of 450° F. This is an indication of gasoline containing a large quantity of kerosene. The higher the temperature of the end point the larger quantity of unsaturated hydrocarbons will be found before cleaning.

It is the practice to clean the gasoline and remove the unsaturated hydrocarbons by a sulphuric acid treatment, removing most of the acid, neutralizing the remaining acid held in suspension by the gasoline by the use of an alkali, and washing with water. The acid absorbs the unsaturated hydrocarbons, thereby producing sulphones which in turn

are washed with water.

are washed with water.

It is our conviction that a gasoline which has not been in touch with an acid will have decided advantages over one which has. It is also our conviction that a gasoline produced without a heat treatment, such as the distillation at present universally practiced at oil refineries, would be free from cracked or unsaturated hydrocarbons, thereby eliminative the program of the product for such acid treatment. A series of exing the necessity for such acid treatment. A series of experiments have lately been conducted with the following

### Experiment No. 1

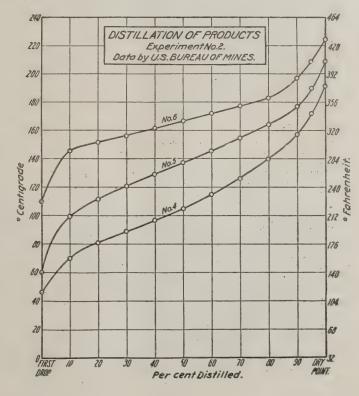
Extraction direct from crude oil.

Raw product, West Virginia cr Raw product, quantity used in		
Gasoline produced:	Gallons.	
No. 1, 69° Baumé No. 2, 58° Baumé No. 3, 55° Baumé	10	
Residue, 37° Baumé		
Per cent volatile products		
No 1 is high-grade aviation of	acoline	

No. 2 is automobile gasoline.

It is our opinion that a mixture of Nos. 1 and 2 would prove to be a satisfactory aviation gasoline.

All these gasolines evaporate clean and without leaving



### Experiment No. 2

Treatment of crude benzine or first cut from West Virginia crude oil.

Raw product, crude benzine	62°	Baumé
Quantity used in experiment	97	gallons
Gasoline produced: Gallons.		
No. 4, 65° Baumé 51		
No. 5, 59° Baumé		
<del> 87</del>		
No. 6, residue, 53° Baumé		
	97	gallons

No. 4, 65° Baumé, is aviation gasoline. No. 5, 59° Baumé, is automobile gasoline.

TABLE I-Products of experiments.

	Experiment No. 1			Experiment No. 2		
Product No	1	2	3	4	5	6
Specific gravity. Degrees Baumé. Color Odor Unsaturated Doctor test. Actidity Loss	0.704 68.9 W. W. O. K. 1.2% + or — None. 1.5%	0.745 57.9 W. W. O K. 1.4% + or — None. 1.0%	0.756 55.2 W. W. O. K. .8% + or — None. .1.0%	0.7165 65.4 W. W. O. K. .8% + or — None. 1.5%	0.741 58.9 W. W. O. K. .8% + or — None. 1.0%	0.7645 53.1 W. W. O. K. .7% + or — None.

### Description of Process Used in Experiments

Crude oil or benzine was placed in a closed tank which was supplied with heat from a gas burner sufficient to maintain the temperature at around 200° F. Natural gas at a pressure of about 100 pounds and a temperature approximately 150° F, was allowed to hubble through the sure of about 100 pounds and a temperature approximately 150° F. was allowed to bubble through the oil and thereby absorb the vapors of the lower boiling point hydrocarbons contained in the crude petroleum. This charged gas, at its then reduced pressure of about 10 pounds passed to a single cylinder refrigeration machine and was compressed to about 125 pounds per square inch. During the compression stroke a small quantity of glycerine was sprayed into the

cylinder by means of the high gas pressure on the delivery side of the compressor, and mixed with the gas and hydro-carbon vapors therein. The compressed gas, with its then condensed and entrained gasoline, plus the injected glycer-ine, passed through a settling tank where the most of the glycerine and some of the gasoline were deposited, and then through a water-cooled condenser where the most of the remaining gasoline vapors were condensed. A separator was next in line and served to remove the condensed gasoline heater where its temperature was raised to around 200° F. by transfer of the heat of the authority by transfer of the heat of the exhaust gases from the gas engine which operated the refrigerator meahine. This reengine which operated the refrigerator meahine. This reheated natural gas then again passed to the tank containing the crude material and so completed the cycle.

During the experiments a small amount of the natural gas was lost by leakage or otherwise and it was necessary The glycer to admit more to the system from time to time. ine which was injected into the compressor cylinder to aid the cold water circulating through the compressor cylinder jackets to abstract the heat of compression and maintain the temperature of the compressed gas and vapors at a low point. The amount of gasoline vapor condensed from the charged gas as the result of the compression was thereby increased. The low temperature of the gas and gasoline vapor condensed the compression was the charged gas as the result of the gas and gasoline vapor charged the compression was the charged gas as the result of the gas and gasoline vapor charged gas and gasoline v line vapors also obviated any material cracking or chemical breaking down of the various hydrocarbons contained. It is also believed that the glycerine was to a certain extent instrumental in removing by absorption some of the impurities contained in the gasoline vapors as received in the compression cylinder.

The experiments were not carried far enough to determine the ultimate possibilities of the glycerine injection process as a means of removing water, sulphur, sulphur compounds, and other impurities from the gasoline. The apparatus used and other impurities from the gasoline. The apparatus used was assembled from material readily available on the market, so that the results do not represent the economic value of this distillation process.

complete description of the several modifications of the fundamental process described in the above note is contained in patent specification No. 193624, filed September 28, 1917, and entitled "Process of cleaning and refining distillates of petroleum.

### GENERAL RULES TO BE OBSERVED AT ALL U.S. FLYING FIELDS

During the rush of war the rules of flying pertaining to aviation activities were left entirely to the Commanding Officer of each and every Air Service Sta-This resulted in such a state that pilots flying under the rules of one field found themselves breaking all of the rules of the field when entering another station. For this reason and for the sake of standardization of flying fields, general rules which pertain and apply to all Air Service activities have been compiled. They contain only general rules in regard to hangars, machines, ground rules and rules of the air, and hold true in all Air Service Stations. It is understood that each field will have special rules peculiar to its own locality. The general rules are as follows: These rules also apply to civilian pilots who may be using a flying field under the permission of the Air Service.

### Hangars

1. Smoking is prohibited in any hangar or within 25 feet of any machine or gasoline container. Notice to this efor gasoline container. Notice to fect to be posted in the hangar.

2. Landing or taking off must not be

over hangars.

3. Visitors will not be allowed on the flying field or in the vicinity of hangar unless they are accompanied by an of-ficer or enlisted man of the post.

Landing near hangar is prohibited. Hangars must be cleared by 50 feet.

### Machines

1. The crew chief will personally in-

spect and see that all safety belts are securely fastened and fit snugly; in case a seat is empty that the safety belt is so fastened as to prohibit it ever becoming entangled in the controls.

- Instructors and students in flying will not wear a long coat or loose clothing that might become entangled in the controls, nor will loose articles such as waste or rags that might jam the controls be left in the machine.
- 3. In leaving a machine always head it into the wind and change the propeller to a horizontal position.
- Unless alone pilots should not attempt to start a motor without assistance.

(This is properly a cross-country rule.) 5. Do not take a machine into the air

- unless you are satisfied it is in perfect
- 6. Never leave the ground with the motor leaking or running poorly. take a machine in the air until you are thoroughly familiar with the working of the throttle, the switch, the gasoline shut-off, the oil pressure, the air release, the air-pump, and all other controls and instruments.
- 7. If pilot finds anything wrong with the plane he is to report it to his Flight Comamnder and to no one else.

### Ground Rules

1. Ambulances to be on flying field during all flying hours with a surgeon and necessary medical detail in attendance. Ambulance should be equipped

with all necessary tools, such as wire cutters, axes and fire extinguishers.

- 2. A landing "T" will be used on flying fields to designate the direction of landing and will govern irrespective of the direction of the wind. As far as practicable this "T" will be kept headed into the wind.
- when on starting lines, instead of turning short, have tail lifted around, thus avoiding a turn which might strain the fuse-

3. Do not turn sharply in taxying

- 4. Do not taxy closer to 100 feet to another ship unless mechanic has hold of wing.
- 5. Never get out of machine with motor running until pilot relieving you can reach engine controls.
- 6. Pilot must clearly inspect machine before taking same into the air. Inspect action of controls.
- 7. In taxying to take off position, oblique machine to right or left to make sure that the section of the field you are going to use is clear, and that no other machines are coming in to land directly behind you.

8. Machines in flying into field have preference over those about to leave.

- 9. It is advisable to carry a good pair of cutting pliers in a position where both passenger and pilot can reach them in case of an accident.
- 10. Never use glass goggles. No flights should be made without goggles or a helmet. Handkerchiefs should be carried

in a handy position in order that goggles may be wiped off.

11. Riding on steps, wings or tails a machine is forbidden.

12. A fire extinguisher will be carried on each machine.

13. Before leaving ground pilots and passengers will make sure that belts are securely fastened.

14. After coming on a bed line allow motor to idle a few minutes to prevent sudden cooling of motor, thus warping

15. In taking off, look on the ground and in the air behind in front and to

either side.

16. In taking off never start suddenly.
Open throttle change and take the first 20 feet slowly, thus avoiding other pilots that are about to take off.

17. In case engine fails on take f, land straight ahead regardless of

obstacles.

18. A plane with a dead motor has the right of way in landing.19. No plane is to taxy faster than a

man can walk.

Do not forget to close throttle be-

fore starting motor.

21. In taxying hold elevator back, never taxying with tail end without man

holding the wings.

22. Planes will not be taxyed abreast.
They will follow 100 feet in the rear of

the preceding machine.

23. Never run motor so that blast from the propeller will blow on other machines or in the direction of the hangar.

24. Motors will be tried out only in the presence of the Fying Officer.

25. Rules about right of way are for guidance only. Collisions are always avoidable. There is no right of way. Every pilot must be awake at all times and prevent his machine from getting and prevent his machine from getting dangerously near another machine.

Never turn a machine after landing until you have looked around you

and are sure the path is clear.

27. No two cadets shall fly together. Cadet must be accompanied by an instructor when flying dual.
28. No ship will cross the line when

motor is running.

### Rules of the Air

1. Speed always means control. of sped means loss of control. starts to miss while getting out of field always nose plane down to gain flying speed before trying any maneuvers. Most crashes are caused by trying to turn close to the ground without sufficient flying speed.

2. After flight has begun if conditions arise that make flying hazardous, land as soon as possible.

3. Do not trust any altitude instru-ments. Learn to judge altitude, espe-cially on landings. Barometric conditions may change in a cross-country flight, so that even a barometer that is functionproperly may read an incorrect alti-e. Moreover, the altitude of the landing place may be different from that of

the starting point,
4. An officer in charge of flying will prescribe whatever rules are necessary and advisable to cover such lines of traffic as are necessary to eliminate the possibility of accidents when machines are coming into and taking off from the home

5. In all maneuvers where altitude is lost rapidly, be sure that no machines

are under you.

6. If other machines precede you in starting, allow them to gain a sufficient distance before following. Do not follow in trace; propeller wash will thus be

7. In passing a machine going in the same direction, have an interval of at

least 200 yards.

In passing over or under another machine, interval must be at least 200 yards.

9. Machines approaching head-on pass to the right at an interval of at

least 200 yards.

10. Before beginning a glide see that no machines are under you. Those flying beneath you have preference.

11. If you see another machine, get out of its way. Do not depend upon the other pilot having seen you.

12. At all times keep machine in such position, in reference to suitable ground, that a landing can be effected at any time.

13. Do not cut across bows of other machines when making your first turn.

14. No vertical banks, steep climbing turns or zooming will be done under 300 feet.

15. All acrobacy such as loops, wingovers, eights, rolls, half-rolls and spins must be completed at not less than 1,500 feet.

All instruction in forced landings is to be done with the instructor in the

machine.

Come out of steep side-slips and spirals at not less than 300 feet.

18. At no time will "hedge-hopping"

be tolerated.

19. No machine will take off until the officer in charge has been notified of proposed air route to be followed, the

purpose of a flight and the names of both

pilot and passenger.

20. All landings will be made on the home field except in case of forced landings or to assist another pilot whose ma-All such landchine has been wrecked. ings off home field will be reported immediately upon return to the officer in charge of flying.

21. No pilot will fly over a city or town without sufficient altitude to reach

a landing place.

22. All pilots going out for acrobatics will be assigned to sectors far enough from the field so that they will not interfere with the regular traffic.

No acrobatics will be indulged in without the permission of the office in

charge of flying. 24. Whenever possible, landings and take offs will be directly into the wind. There will be a trouble-shooter on

the field at all times when flying is going on.

26. No spins on back or tail slides will be indulged in as they put unnecessary strain on the machine.

All machines will land in a straight

glide from 500 feet.

No acrobatics at any time will be

done over the field.

To go off the ground in a side wind, be sure to allow the machine to have flying speed before attempting to arise then turn slightly into the wind, gain a safe altitude and then level out before attempting to turn and go with the wind.

30. If machine slides in, use more rudder or take off some of your bank

or combine both.

31. If flying against the wind and you wish to turn and fly with the wind, do not make a sharp turn close to the ground.

32. In gliding for a landing, it gliding flat at a high altitude, increase the angle of the glide and store up speed when approaching the ground. If gliding flat and you wish to make a turn, increase pick up speed, then make the Glide steep rather than flat. Increase glide for a turn.

33. Motors have been known to stop during a long glide on account of running same throttled down too low. If pilot wishes the use of motor for landing, open throttle at intervals during the glide.

34. In coming down with excess speed, level out and allow machine to skim along close to ground. Do not attempt to force machine on ground with more than fly-ing speed; the result is bouncing and ricocheting.

(Continued from page 496)

he did not know of anything he was getting from them. There is no efficient system of information whereby each department gives the other departments the benefit of its experience. They ought to know what we are doing and we ought to know what they are doing. It is this lack of co-ordination that costs money to the Government."

The above is in direct variance with the approved policy of the War and Navy Departments. The Air Service of the Army maintains a liaison officer in the Office of the Director of Naval Aviation, who is presumed to be conversant with every move made and plan approved. The Engineering Department of the Air Service at Dayton and the Bureau of Construction and Repair of the Navy Department exchange as a routine matter all technical notes,

progress reports, reports on tests, photographs of new devices, etc. The closest touch is kept with technical progress by frequent exchange of visits by engineers of the two services. If Colonel Chandler's Department is not procuring information of the Navy and is not giving it information of his activities, it is because he has been conducting a fight against the aviation policies of the War and Navy Departments.

The impropriety of submitting as evidence to our legislators statements which are not complete or which are incorrrect is self-evident. When such tend to discredit another department of the Government than that to which the individual making them belongs, it would seem particularly true that such should not pass unnoticed.

Very truly yours,

Josephus Daniels.



The Curtiss Three-Passenger ORIOLE

# Aerial Carriers De Luxe

Air travel at from 75 to 100 miles per hour is now luxurious, safe and efficient. These machines will be included in Curtiss Exhibits at the Chicago Aeronautical Show, January 8th to 15th, and at the New York Aeronautical Show, Seventy-first Regiment Armory, March 6th to 13th.



The Curtiss Eight-Passe

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# The Science back of the NC-4

The Science back of the NC-4, first to cross the Atlantic, and the Curtiss Wasp, altitude record maker, has been applied to these new passenger and merchandise aeroplanes by the organization which has long been the dominating center of aeronautical activity in America.





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# DENSITY CLASSIFICATION OF LAMINATIONS FOR AEROPLANE PROPELLERS

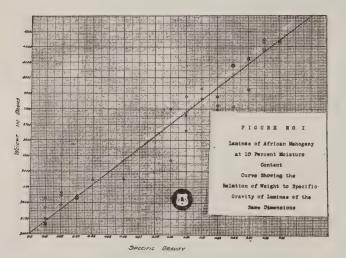
By E. F. HORN

Formerly Assistant Engineer in Forest Products, Forest Products Laboratory, U. S. Forest Service, Madison Wisconsin

DENSITY is the best criterion of the strength properties of wood aside from actual tests, and is an important working factor in selecting laminations of the same strength for a propeller.

The amount and rate of shrinkage of wood varies with its density. High-density wood shrinks less rapidly than low-density wood, although it eventually shrinks more for the same change in moisture content. The density of wood also affects the rate at which moisture is absorbed and therefore affects the balance of a propeller, since if both blades do not absorb moisture at the same rate the propeller goes out of balance. Since the density of wood affects its strength, its shrinkage and swelling, and its absorption of moisture, it is important that the material used in propellers be selected according to density.

While density determinations cannot be made on the lamination itself, or on small pieces from it, they can be made on adjacent samples which represent the density of the lam-



ination. The density of lamination is somewhat variable, and numerous cases have been found where the variation within a lamination was from four to five times the tolerance of .03 allowed in the aircraft specifications. In propeller manufacture, the ordinary practice is to take only one sample for each lamination. The density of the single sample may be quite different from that of the lamination, however, in which case large differences in density in the propeller might result. In order to get the average density it is necessary to take samples at several points adjacent to the lamination. Such a method entails a great deal of labor and is likely to be unreliable unless a personnel particularly fitted for this kind of work is available.

### Density Independent of Moisture Content

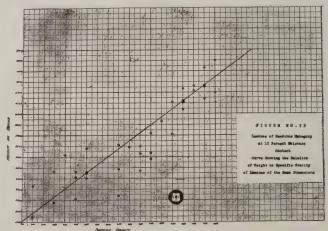
The weight of wood is the weight of its component parts, chiefly ligno-cellulose and water. Its density depends largely on the ligno-cellulose, being independent of the weight of the water. If the moisture content of several pieces, all of the same volume, becomes uniform, the density of the pieces will vary directly with their weights. If laminations uniform in thickness and cut to pattern size are left subject to uniform conditions, the moisture content of all will become practically the same, and a lamination of high density material will then weigh more than one of low density material, their densities being proportional to their weights.

### Securing Uniform Moisture Content

In order to bring the laminations to a uniform moisture content, they must be kept in a storage room where the temperature and relative humidity are maintained uniform. When material is delivered from a kiln there may be a variation of 5 or 6 per cent in the moisture content throughout the load, and conditioning in storage rooms is necessary in order that the moisture content may become uniform. After this conditioning, the moisture content of woods used for making propellers will be uniform within less than one per cent. A difference of .01 in density is equivalent in weight to a 2.0 per cent change in moisture content, so that after conditioning the differences in weight between laminations of the same size are due almost entirely to difference in density.

### Classify Laminations by Weight

Results of work at the Forest Products Laboratory of the U. S. Forest Service, Madison, Wis., in co-operation with the U. S. War and Navy Departments show that at the same moisture control density classifications can be made according to weight. The laminations were cut out, and an average of 5 samples was taken from the adjacent sides upon which density determinations were made. After being conditioned, the laminations were weighed. Figures 1 and 2 show the results obtained on laminations for two species. The accuracy with which the laminations are sawn to pattern size affects the results, since the volume of all laminations of one size should be the same to get satisfactory results. The curves show, however, that the laminations can be classified by weight to give a limiting density range of less than .03 from the average of all laminations. In order to determine what weights give the same density for the different sizes of laminations, it is necessary to make actual



density determinations on one lamination of each pattern size. Then with the weight and density of one lamination determined, the weight at any other density can be calculated as well as the weights for laminations of different size but of the same density.

The labor and equipment required are greatly reduced when laminations are classified by weight. Laminations need be weighed but once after they have been in a conditioning room long enough to reach equilibrium. The method, however, requires that the stock be cut out several weeks in advance of gluing. Density classification by weight is not only a simpler and more accurate method but also serves to solve the problem of variable moisture content, an equally important factor in the retention of shape by propellers.

# **ALUMINUM AND ITS LIGHT ALLOYS**

By PAUL D. MERICA

HIS is the subject of a recent circular issued by the Bureau of Standards. It contains information compiled from various sources, including the published literature, manufacturers of aluminum and its alloys, Bureau of Standards test reports and miscellaneous correspondence on the physical and mechanical properties of aluminum and its light alloys, with chapters included on the corrosion and deterioration of the metal and its alloys.

A summary is given of the research work which has been done here and abroad on the constitution and mechanical properties of the various alloy systems with aluminum. The mechanical properties and compositions of commercial light alloys for casting, forging, or rolling, obtainable in this country, are described.

The circular is completed by a bibliography of sources of data and information. A table of contents follows:

A. Aluminum:

I. Commercial aluminum-

Sources, metallurgy.
 Commercial grades, uses.

3. Production, price.

II. Metallography.

III. Chemical properties-

1. Corrosion-

(a) Protection of aluminum against corrosion.

2. Aluminothermy.

IV. Physical properties—

1. Electrical, magnetic—

(a) Electrical conductivity.
(b) Thermo-electromotive force.
(c) Electrolytic solution potential.

(d) Magnetic susceptibility.

2. Thermal-

(a) Change of state.
(b) Thermal conductivity.
(c) Thermal expansivity.

(d) Specific heat.

3. Optical.

4. Mechanical-

(a) Elasticity. (b) Tensile test.

(c) Compression test.

(d) Hardness.

(e) Alterating stress test.

Miscellaneous-

(a) Density.

V. Physical properties at higher and lower temperatures. VI. Technology—

Casting.
 Working.

Welding and soldering.
 Electrolytic deposition.

5. Miscellaneous operation.

VII. The properties of aluminum as affected by mechanical work and by heat treatment.

(b) Light aluminum alloys.

VIII. Investigation of alloy series—

Aluminum-copper.
 Aluminum-iron.

3. Aluminum-magnesium.

4. Aluminum-manganese and ganese-copper.

Aluminum-silicon.

7. Aluminum-zine 8. Miscellaneous. Aluminum-zinc.

(a) Schirmeister's investigations of binary systems.

Duralumin.

Miscellaneous alloys

X. Physical properties of light alloys

Corrosion and disintegration of light alloys.

Comparison of density and mechanical properties of aluminum alloys with other material of construction.

aluminum-man-

Aluminum-nickel and aluminum-nickel-copper.

III. Report of Investigation of the Heat Treatment of Alloys of Aluminum and Magnesium with Copper, Man-ganese, and Nickel, Respectively (b) Equilibria, binary, and ternary.

IX. Commercial alloys—

1. Casting and die casting.

2. Rolling and forging.

It is known that the highest physical properties of aluminum alloys containing magnesium and copper are not obtained without heat treatment either immediately previous to or subsequent to the final forming operation. Wilm has shown that the tensile strength of the alloy of magnesium and aluminum is increased by quenching the alloy from approximately 500° C. and allowing it to age for several days, and the post-content of t and has patented this heat treatment process. Curiously enough the hardening effect in aluminum alloys is not ob(Continued on page 511)

XIII. "Heavy" aluminum alloys.

XIV. Appendix

. Definition of physical terms. Specifications for aluminum and its alloys.

3. Bibliography.

In addition to the information contained in Circular 76 of the Bureau of Standards, attention may be called to the series of reports issued by that Bureau during the year 1918, on the general subject of aluminum alloy investigation. Some of the important conclusions of these reports

### I. Report of the Preparation and Tests of Magnesium Aluminum Alloys

This work consisted in the melting and casting of some 16 alloys at the bureau, tests of some of these alloys as cast, the forging at the navy yard and the rolling at the New Kensington plant of the United States Aluminum Co. of others, and the testing of these alloys as rolled and as heat

Although the work was not extended enough in character to admit of very far-reaching conclusions, the following may

to admit of very far-reaching conclusions, the following may be regarded as established:

1. For forging and rolling alloys the magnesium content may apparently mot go above 3 per cent since, without exception, it was impossible to forge the 6 per cent magnesium alloy and those containing only 3 per cent of magnesium forged and rolled quite badly.

2. Magnesium aluminum alloys of magnesium content higher than 3 per cent are of no value for rolling or forging and have questionable value only for casting, for the reason that they react most readily while hot with air, nitrogen, and water. The exact limits of composition for magnesium aluminum casting alloys have yet to be determined, however.

3. The tensile strength values obtained upon these alloys

in no case were superior to those of standard duralumin.

# II. Report of the Preparation and Tests of Rolled Alloys-Aluminum-Magnesium-Nickel, Aluminum-Magnesium-

Copper, Aluminum-Magnesium-Manganese
The results of these tests on the three ternary systems in-

dicate the following important conclusions:

1. The alloys of aluminum-magnesium-manganese are not affected by heat treatment; the alloys of aluminum-magnesium-nickel only very slightly; the alloys of aluminum-magnesium-copper show a decided improvement in the physical properties after heat treatment, amounting to as much as 50 per cent increase in the tensile strength. (See Report III).

2. Even in the rolled or the rolled and annealed condition the manganese and nickel ternary series are inferior to the copper series as far as physical properties are concerned; arranged according to strength, the copper series come first, then the manganese series, and finally the nickel series.

3. In the aluminum-magnesium-copper series it is advantageous to have the copper content larger than the magnesium

The general conclusion then from this investigational work is that from the standpoint of physical properties, tensile strength, and hardness, the aluminum-magnesium-manganese and aluminum-magnesium-nickel series are not to be considered, since they are quite inferior to the aluminum-magnesium-copper series. It should not, however, be assumed from this that for all purposes the former two series are not useful, since for some applications it is more desirable to have an alloy which is resistant to corrosion or which retains its strength at higher temperatures rather than to have merely a strong alloy. For such purposes these series may prove to have a value more nearly equal to that of the copper series.

# THE BREGUET COMMERCIAL AEROPLANE, MODEL XIV

THE Breguet Commercial and Touring Biplane, known as Model XIV, has been in daily service since March between Paris, Lille and Brussels, 400 miles each way, without any accident whatever. During the summer months a regular schedule was maintained between Paris and the coast of Normandy, with a flying time of an hour and a quarter.

This type of plane is also being used to alternate with the Handley-Page biplanes on the London-Paris service, the flying time being two and a half hours. These are but a few instances of the excellent performance of the Model XIV Breguet. The manufacturers are seeking to develop an American market for their product and in view of the reliable services which have been maintained by Breguet aircraft.

### General Characteristics.

A single 300 horse-power engine driving a tractor propeller is used, either of Renault, Lorraine-Dietrich or Hispano-Suiza manufacture. The dimensions of the cabin are 2 meters in length, 80 centimeters in width and 1 meter 30 centimeters in height. The following are the general specifications of the machine:

Spread of wings—upper wings, 14 m 364; lower wings, 12 m 400. Total length—9 meters; height—3 m 300; carrying surface—49 square meters; fuel capacity—300 liters; duration of flight—4 hours.

Performance

The load carried, of course, varies with the service in which the plane is placed, the following performance is obtained with a load of 730 kilograms:

Greatest climbing speed—2,000 meters in 9 minutes 5 seconds; 3,000 meters in 17 minutes; 4,000 meters in 26 minutes 30 seconds; 5,000 meters in 47 minutes 30 seconds; 5,000 meters in 47 minutes 30

Greatest height-5,500 meters.

Maximum horizontal speed—On the ground, 178 kilometers an hour; at 2,000 meters, 173 kilometers an hour; at 3,000 meters, 168 kilometers an hour; at 4,000 meters, 159 kilometers an hour; at 5,000 meters, 145 kilometers an hour.

The Cabin

The cabin is designed with a view to accommodating either a number of passengers or a cargo or packages. The dimensions of the cabin space are as follows: length, 2 meters; width, 80 centimeters; and height, 1 meter 30 centimeters. The cabin is situated immediately behind the engine.

When fitted for passenger carrying, two upholstered chairs are provided, one of which has a revolving back, so that the passengers may seat themselves facing forward or opposite each other. The interior is most luxuriously appointed. In front of the cabin a bracket seat permits the carrying of a mechanic or third passenger.

A windshield and portholes at the sides and roof of the cabin afford an excellent view of the landscape and assure very good light under all conditions.

Sliding windows at the sides can be adjusted to suit the weather so that proper ventilation is possible under all conditions.

A side door at the right side of the body permits of easy entrance into the cabin.

When fitted for baggage or mail transport, a load as large as 800 kilogrammes may be carried, in addition to adjustable folding seats, so that passengers may be

folding seats, so that passengers may be carried instead at any time.

The pilot's seat is immediately behind and above the cabin, quite to the rear of the nacelle. This affords an excellent view both for piloting in the air and for landing. All the controls and control wires are outside of the cabin, so that they cannot be interfered with by the passengers. A radiator thermometer, a tachometer and an air speed indicator are provided.

Fuel Supply

Two spindle-shaped gasoline tanks are placed at each side of the nacelle between the wings. The usual equipment has a capacity of 300 litres, but on special order tanks with a capacity of 640 litres can be provided, permitting of a larger flight radius. Gravity feed direct to the carburetor eliminates all pumps and other means of pressure gasoline feed.

The normal consumption at a commercial speed of 100 miles an hour is 88 litres of gasoline per hour and 3.2 litres of oil.



The Breguet Commercial four passenger machine, in daily service in France

### **BOOK REVIEWS**

Air Navigation, Notes and Examples. By Capt. S. F. Card, B.A.R.N.

The author's treatment of the subject is intended for the man with a limited knowledge of mathematics, elementary plane geometry being the most advanced training assumed. Captain Bard's training as an instructor has fitted him for the preparation of this text book with the result that its explanations are clear and concrete and it is replete with practical examples.

The contents are grouped under the following heads: The Measurement of Distance; The Measurement of Distance; The Measurement of Direction; Position By Cross Bearings; The Magnetic Compass; Taking a Bearing; The Effect of Wind; The Estimated Position; To Find the Course, Allowing for Winds; Joining Up with a Squadron; Scouting

Range or "Radius of Action"; Course and Distance Calculators; Fixing By Angles; The Magnetism in an Aeroplane; Adjusting the Compass; Wind and Weather; Appendix of Examples; Specimen Examination, Papers: Answers to Examples

ination Papers; Answers to Examples.
This volume can be purchased at the Aeronautic Library, Inc., 299 Madison Avenue, New York City, N. Y. Price, \$3.40 net; \$3.60 postpaid.

THE AERIAL ARM. By Lieut.-Col. N. G. Gill, C.B.E.M.C. With an introduction by Major General Sir W. F. Brancker, K.C.B., A.F.C.

The author points out the importance of the aerial arm in determining a nation's military power. A nation's greatness depends on her ability to uphold her

rights; the new aerial arm is a leading factor in this power, regardless of any future power which a League of Nations may at some time possess.

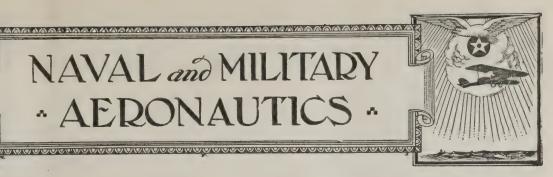
As a means of most economically maintaining the nation's military aeronautic power, the author suggests the maintenance of a flourishing aerial commerce in time of peace to serve as the most practical and economical reserve for use in national emergencies.

Contents: The Atmosphere; Airships; The Aeroplane; Progress in Aeroplane Design; The Evolution of Types; Navigation of the Air; The Military Use of Aeroplanes; Co-operation Afloat; Air Power.

Procurable at the Aeronautic Library, Inc., 299 Madison Avenue, New York. Price, \$2.25 net; \$2.50 postpaid.



# NAVAL and MILITARY AERONAUTICS



### Aircraft a Feature of Naval Manoeuvres

Washington.—Swift scout or "spotting" planes, seaplanes of various types, at least one non-rigid dirigible and kite balloons will be utilized extensively in the forth-coming winter manoeuvres and battle practice of the Atlantic Fleet in Southern waters.

The work will be largely experimental, since the Naval Aviation Service is short of equipment and adequate means of transporting it.

The "spotting" planes, which are launched from the tops of turrets of dreadnaughts, will be transported by the several battleships from which they operate.

Seaplanes of various types and dirigibles will proceed to Guantanamo under their own power, escorted by the aircraft tender Shawmut.

Admiral Henry B. Wilson, Commander in Chief of the Atlantic Fleet, is interested in aviation and anxious to develop the use of aeroplanes and dirigibles as an

adjunct to naval operations.

The Naval Aviation Service is handicapped by the lack of adequate carriers for aircraft, such as the British Navy developed toward the end of the war and

### Predicts 3-Inch Guns on War Aeroplanes

Brig. Gen. William Mitchell, Army Air Service, in an address at Washington, D. C., made the prediction that artillery would soon be mounted on and fired from American aeroplanes. He said: "Many American aeroplanes. He said: persons believe aeroplanes cannot stand the strain caused by the firing of cannon mounted on them, but I believe the plan is perfectly feasible and that artillery will be effectively utilized on aeroplanes in the next war. Nearly two years ago I saw a French 75-mm. gun mounted on a French aeroplane, and the gun was fired without damaging the plane. I believe 3-inch artillery will be mounted on American aeroplanes in a comparatively short time. General Mitchell also said that a new use in war would be made of parachutes and that men armed with machine guns would be dropped from aeroplanes into enemy territory with demoralizing effect.

### Air Service Personnel Board

A board in session in Washington, appointed to recommend emergency officers for permanent retention or appointment as commissioned officers for the Air Service, is composed of Cols. Charles DeF. Chandler and Thomas DeW. Milling, Lieut. Cols. Shepler W. FitzGerald and Augustine W. Robins, Major Walter R. Weaver and Capt. Harry C. Sigourney, the latter acting as recorder. The board the latter acting as recorder of the Air Service. the latter acting as recorder. The board is examining all records of the Air Service commissioned personnel and those in the Aviation Section, Signal Reserve Corps, and those former Air Service officers who were applicants for permanent commission. The board's report will show the relative desirability for reten-tion and the rank recommended for all emergency officers now on duty with the Air Service; the same for officers of the Signal Reserve Corps now on inactive duty; the same for all former Air Service officers who are applicants for commission. Major Gen. Charles T. Menoher, director of Air Service, desires that each emergency officer now on active service appear personally before the board, and within this end in view he has directed the board to visit from time to time various Air Service activities. The report of the board will be confidential.

### To Test New Type of Small Plane

Interest of fliers in Washington has been aroused in a new type of plane at the Navy Air Station, Anacostia, D. C. This miniature monoplane is called the Loening Kitten. It has a wing spread of only ten feet and length of eight feet over all. It is supplied with a three-cylinder Anzani motor of forty-five horsepower. The plane is being prepared for test under conditions simulating taking off from the gun platform of a ship.

### For Reserve Officers

Attention is called to the fact that officers of the Aviation Section, Signal Officers Reserve Corps, have been authorized to wear the insignia now worn by officers of the Air Service in addition to the letters "U. S." with superimposed "R."

### Training Begun at March Field

Active training of cadets at March Field began just after the first of the year. A number of cadets from other fields have been transferred to March and a number of cadets have been received at the field from civilian life. The aviation fields sending cadets to March Field are: Kelly, Eberts, Barron, Rock-well, Brooks and Mather.

The Commander of the cadet detachment is Major George H. Peabody with Lieut. E. S. Norby as Adjutant.

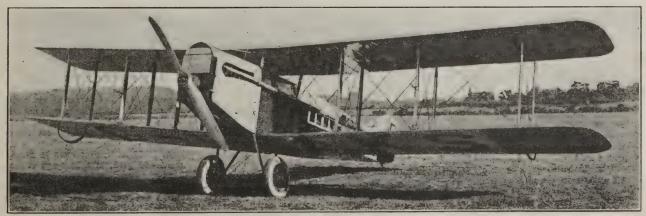
### New "Butterfly" Map Will Aid Aerial Navigators

San Francisco.—Flyers in the proposed 1920 world-girdling derby will not travel by Mercator's projection, but by a new "butterfly" map devised by B. J. S. Cahill, of Oakland, which has just been adopted by Major Charles J. Glidden, executive secretary of the Aerial Derby Commissional Charles and the Far Fast and sion, now on his way to the Far East and who gave the map his approval before leaving here

Mr. Cahill, who is the originator of San Francisco's \$12,000,000 "civic center" plan, said that an aviator using the Mercator projection as a guide would go 1,000 miles out of his way in a trip from Panama to Yokohama. "If the North Pole were on an island a mile wide," he said, "it would appear on Mercator's projection to be 25,000 miles wide, or nearly the total circumference of the earth at the equator."

The inventor of the new map, who worked on his drawings fifteen years, said that "an impartial and rational world said that "an impartial and rational world geography is essential to world peace." He said that Mercator's projection, which was originally devised by the Belgian cartographer as a guide for navigators, "distorted and exaggerated the earth as it receded from the equator." This, for instance, made it appear as if South America was made by maller than North America was made to said the said of the sai ica were much smaller than North America, when, as a matter of fact, he said, they were about the same area.

The Cahill map is as though an actual sphere has been cut and flattened, its appearance somewhat resembling the out-spread wings of a butterfly.



The Sopwith Australian Transport "Wallaby," equipped with Rolls-Royce Eagle VIII



# FOREIGN NEWS



### New British Air Chief

London.—Major George Clement Tyron, Unionist member of Parliament for Brighton, has been appointed to succeed Brig. Gen. John E. B. Seely as head of the Air Ministry.

Gen. Seely resigned his post as head of the Air Ministry last month and took a seat on the opposition bench in the House of Commons. Major Tyron is a son of the late Vice-Admiral Tyron.

### To Fly from Holland to Indies

The Hague.—An aeroplane flight from Holland to the Dutch Indies, with Lausanne as the first stopping place, is being arranged by M. Fokker, the aeroplane inventor, it is stated.

### Many Marvels in Paris Air Show

Many Marvels in Paris Air Show

Peris.—President Poincare, assisted by Marshals Foch and Petain, on December 19 opened the world's greatest exhibition of aircraft. The sixth Exposition of Aerial Locomotion, held in the Grand Palais, is the first since 1913, and its 400 exhibits picture the marvelous advance in aviation in the past six years. There is no American offering.

The marvels of this great show almost exceed the flights of fancy. But one feature overtops all others, and that is the development of luxurious pleasure craft of the air. There are smart military fighting planes; here are business, ike mail-carrying planes; but it is the pleasure planes that are emphasized. The note of luxury runs through all the show, from the little 200-pound Marcay to the giant liners of the air, with accommodations for twenty, twenty-five and thirty passengers. Four exhibits a and out above the others:

First, there is the Bleriot "mammoth," compact, beautiful, enormous, powerful. This carries twenty-eight passengers, with all traveling conveniences. There are two decks for passengers. Fitted with four 300-horsepower motors, the great biplane stands as high as a two-story house. The engines are arranged in pairs, two above and two beolw. It makes 100 miles an hour and can run for six hours without replenishing fuel.

Near it stands a giant Cuadron biplane which carries eighteen passengers. Its cabin is the most luxurious at the show. Fitted in velvet cushioning, it is dainty in details, down to the blue silk curtains at the windows.

The third feature is the Farman "Goliath," which carries twenty

windows.

The third feature is the Farman "Goliath," which carries twenty

passengers.
Fourth, there is the great Handley-Page, all in white, which carried eighteen passengers from London to Paris in one hour and fifty

minutes.

These four machines represent the highest achievement in touring

minutes.

These four machines represent the highest achievement in touring aeroplanes.

There is also a giant Caproni, with a wing stretch of nineteen feet and carrying eight passengers.

Of interest to Americans should be the new Fiat biplane, with two places, which has been built to make a trip across the Atlantic. It has a speed of 102 miles an hour and carries fuel for a twenty-hour flight. It is called "the most powerful aeroplane yet built."

There are scores of handsomely built planes, carrying from two to five persons and advertised as limousines and landaulets.

A new development of much interest is the "motor glider," which is a boat drawn by an air propeller. This craft had its origin in the development of power boats to navigate rivers in Africa in which weeds grew too thickly to permit the use of underwater propellers. It has been developed into a magnificent pleasure boat, carrying from fifteen to thirty persons and capable of great speed. It does not leave the water, but skims on its surface.

One remarks the absence of freight-carrying machines, to which European manufacturers appear to have paid no attention. The production of pleasure aircraft seems to be almost their sole effort.

Many salons of the palace are given over to military aircraft, and there is a veritable museum of Spads, Nieuports, and all the other fighting machines which became famous during the war.

While England and Italy are well represented, the exhibition is predominantly French. I heard many visitors cominent on the fact that American aircraft manufacturers were not represented at all.

### American Crew for R 38

It is anticipated that the airship R 38, which has been sold to the United States, will not cross the Atlantic before next July or August. She is now being completed at the works of Messrs. Short Brothers at Bedford, and should be ready about the end of May. A crew, drawn from the United States Navy, will be trained by the R. A. F. in readiness to take the vessel to America.

### French Convention with Switzerland

French delegates have practically concluded with Switzerland an Air Convention similar to that signed on behalf of Great Britain by Colonel Beatty. As soon as the French Government has signed, the agreement with Great Britain comes into force.

French actresses are proverbially so light and airy that considerable lift should be given to the popularity of "dirigebling" by the adhesion of Mlle. Gaby-Morlay, the Paris stage-favorite, to the practical side of the art. According to a report from the gay city, Mlle. Morlay has for a long time been interested in lighter-than-air flying, and has on many occasions taken lessons from the piloting of dirigible balloons. She has already, so it is stated, passed brilliantly all practical tests which are required for a pilot's certificate, and has now undergone her technical examination, which she has also passed with the greatest success, and thus becomes the first woman pilot of a lighter-than-air machine.

### Carrying Bullion by Aeroplane

It is reported from Mexico City that an English mining company, having extensive properties in the State of Chihuahua, has petitioned the Secretary of Industry and Commerce for permission to establish an aeroplane service. The purpose of this service is to transport bul lion and other valuable articles from the company's mines to points of destination without danger of interference by bandits. Heretofore the use of aeroplanes in. Mexico has been the exclusive privilege of the national Government.

### Present Alcock's Plane to Nation

London.—The historic Vickers-Vimy Bomber, the flying machine in which Alcock and Brown crossed the Atlantic, has been presented to the nation and has been housed in the new Science Museum Building in South Kensington. The presentation by the Vickers and Rolls-Royce companies took place today at the opening of the temporary companies to

### Air Line for Australia

Mir Line for Australia

Melbourne.—It is now expected that next July will see the opening of service by the Aerial Transport, Ltd., a concern which has been organized for the maintenance of aeroplane passenger and express service between Melbourne, Hobart, Adelaide, Perth, Sydney and New Zealand. Ten machines will be put into operation, each having a three ton capacity.

Daily flights from Melbourne to Hobart, Adelaide and Sydney are contemplated, the trips to take 7 hours, 6 and 6½ hours respectively, the last two to be non-stop flights. The fare will be about \$40 a journey, express being 16 cents a pound.

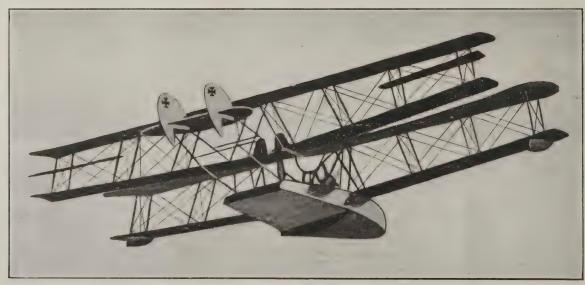
Pope Buys Two Aeroplanes

Rome.—Pope Benedict intends to buy two aeroplanes of the latest type for use on special diplomatic errands of Vatican couriers.

Is Preparing the Plans for Rome-Tokio Flight

Tokio.—Lieut. Gentille, pilot aviator of the Italian army, who has arrived in Tokio to make preparations for the Rome-Tokio flight, says the Italian aviators will make short stops at the following places: Brindist, Saloniki, Adalia, Alepo, Bagdad, Basra, Karachi, Delhi, Calcutta, Rangoon, Bangkok, Amoy, Canton, Foochow, Shanghai, Tsingtao, Peking, Wiju, Seoul, Fusan and Osaka.

The journey is expected to occupy fourteen days on account of the numerous stops the aviators will make en route. At each halting place an officer and two soldiers of the Italian aviation service have been stationed to make preparations for supplying the machines with gasoline and to effect repairs.



The German Oertz tandem biplane flying boat, equipped with Maybach motor



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon



### The Motorcycle Engined Aeroplane

FTER the body is finished and covered, it should be examined to see whether or not it is lined up and if it is all right, proceed with the wings. The wings are simple as there are no ailerons, for the wings are in one piece, thus as there are no ailerons, for the wings are in one piece, thus eliminating much useless weight which would be disastrous in a small machine of this kind. The wings complete should weigh no more than 35 pounds, and when finished will have a factor of safety of 10 or thereabouts. They should be constructed carefully. The total weight of body and wings as well is borne by these parts and they must be made with extreme care—more so because of the lightness of the parts. The body can be made "good enough" if nothing better can be done, but "perfect" is the standard set for the wings. Few machines crumble up in the air today because they are designed machines crumble up in the air today because they are designed

carefully, but when amateurs do the work, there is always a possibility of a defective part entering into the construction. For the reason mentioned above I cannot impress too greatly upon builders the necessity for extreme care when making the wings. The drawing will cover about all that can be said regarding the positions and general construction of the ribs, spars, etc., and there is no need taking up space for anything so obvious but it would be well to mention the for anything so obvious, but it would be well to mention the

sizes and kinds of wood used.

The spars should be made of fir which is a light straight grained wood that can be procured much more easily than clear spruce and is generally well dried and of first class material. The spar is of the "H" or "I" section throughout and is tapered at the outer ends to meet the edging. Where the fittings for the bracing struts are fastened a piece of ½" glued and nailed to build up the groove in the spar so it will flush with the outside edge of the flanges.

The ribs are built up of \( \frac{1}{2}'' \times \text{3/16''} \) spruce or fir battens glued and nailed to webs made of \( \frac{3}{16''} \) spruce, white pine or white wood, lightened as shown in the wing profile. When making the ribs be sure that no nails protrude from the sides of the webs and use only good carpenters' glue, making sure that its hot. This will insure the ribs having the maximum strength.

The nose ribs (those which are placed between the main ribs from the entering edge to the forward spar) are made up of the same materials as the large ones. The ribs on each side of the body should have solid webs. When all ribs

are finished, slide them along the spars to the proper position and fasten with glue and a small brass screw ½" long and ½" thick. The screws are placed top and bottom of the ribs and fastened to the spar. The internal bracing struts should be inserted now and the bracing wires drawn up tight. The fitting for the large bracing struts should next be fastened in place after which the edging along the front and sides can be fastened by inserting between the ends of the rib battens

and a strip of metal should be placed over all.

The edging should be ½/" x 5/6" fir. The bends at the ends of the wings can be made from a hockey stick. The trailing edge is simply a steel piano wire drawn tight and held at

the ends of the ribs by metal clips.

When the wings are completed, they should be spar When the wings are completed, they should be spar varnished and the wires painted to keep from rusting. Then the covering (unbleached muslin) is attached. The covering should be cut into strips if not wide enough to cover the wing chord-wise and sewed together, the seams running fore and aft. Lay on the wing and attach to the inside rib first—then pull tight along the length of the wing and fasten at the outer edges. Now pull the cloth slightly to get all wrinkles and lap one over the other along the wire trailing edge and To set up machine fasten trail in socket, then brace with sew together.

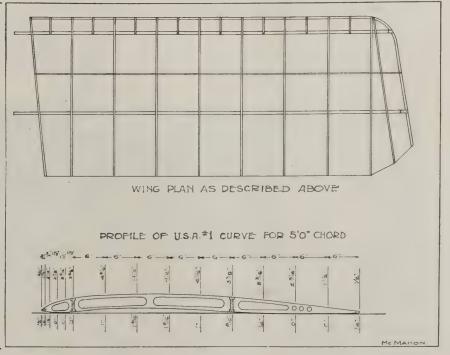
sew together.

tubing as shown allowing for free movement. The rudder is then set on as shown. Control wires to each are cut and pinned into place in sockets provided. Wing bracing struts are then set in place and fastened. General assembly can be determined by consulting the first drawing that appeared. A few remarks regarding flying the machine might be well to hear in mind. bear in mind.

As the horsepower is low, little if any reserve horsepower is available, so for that reason only straight flights or some with large turns can be made. The flights at best will be much the same as the Government training penguins which make flights a few feet above the ground. Of course a great deal depends upon the motor and if the builder should exercise care or procure the 4-valve racing head mentioned earlier in the article better results can be obtained.

The machine covered by these articles can be built as a biplane as well and in the next issue a drawing showing the biplane wimp will be reproduced. The construction of the wings will be the same as in this machine.

The accompanying cut shows general layout of wing panel and wing profile for U. S. A. No. 1 Curve. This drawing is the last of the series covering motorcycle engined aeroplane





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Apropos of the late unlamented censorship the society editor presented his copy to the censor for approval. He found this one: Mrs. Smith announces the engagement of her daughter, Mary, to Lieut Jones, R. N. A. S. The censor blue-penciled the item and noted on the edge of the paper. See censor regulations number nineteen; news of naval engagements strictly prohibited.

Ferdinand, a bright young feller, Built himself a new propeller. Some way up it came unglued— A wreath was sent to Erymtrude.

Basil—flying for his brevet—
Thought his load a trifle heavy.
By and by the load got lighter—
Two hundred pounds—the poor young blighter.

Prob-Flight Sub-Lieutenant Hocking Through his flying, simply shocking. From his plane lost his position Also, lost his first commission.

Doing loops with dear old Gus On an antiquated bus. Bus smashed up with many a splinter, Gus won't feel the cold in winter.

Sammy was a noble Yank. Went aloft and tried to swank; The wind was strong, the flight soon ended. They say poor Sammy can't be mended.

Archie got an awful fright When his Avro caught alight. Father, watching from the hangar, Said, "He'll come an awful banger."

Hughie, on a R E P, Took a damsel out to sea; Returned as soon as he was able, Shouting, "Send a boat for Mabel."

Gaston, piloting a Farman, Some infantry mistook for German. A skilled mechanic pieced the bits; They answered not the name of Fritz.

Paddy, from a Hendon school, Thought he'd show he was no fool. Took his ticket, raided Krupp, Got the V. C.—then woke up.

-Globe.

Son (enthusiastically): Dad, she's an angel.
Dad (calmly): Yes, I knew she was a high-flyer.—Jack
o'Lantern.

Professor (in the psychology class): Now I put the number seven on the board. What number comes immediately to your mind?

Class (in unison): Eleven.

John Gilpin was a citizen— You've heard the tale, of course— Who came to grief at Edmonton While on a borrowed horse.

So when his wedding-day came round, "My dear, we'll take a trip,"
He told his wife, "but in a plane
I mean to have a flip."

I am a linen draper bold And I have got the dough, So straight to Hendon I will hie To fly with the Airco.

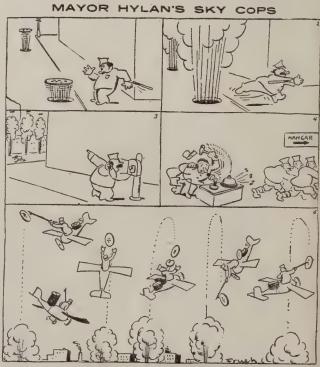
The morning came—John Gilpin went— His wife and children, too. They climbed into a car de luxe And off the ground they flew.

Then over Edmonton they went, And on they flew to Ware. I'd like to write a long romance On how they all did fare.

A poet hasn't half a chance; I feel just like to weep. So nice and comfy Gilpin felt, He went right off to sleep.

Yes, Cowper's got me sadly beat, So here my tale must stop; They landed safe at Hendon 'drome Without a single flop.

-Globe.



Courtesy-N. Y. World

# Ten Cents Per Square Inch Per Thousand

Using the square inch as the unit of advertising measurement in the aeronautic journal field, you will find that the advertising rate of AERIAL AGE is ten cents per square inch per thousand copies.

This is the best buy in aeronautic advertising in America, and AERIAL AGE advertisers have frequently borne testimony to the inquiry getting power of our circulation.

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# Aerial Age Has a Very Real Advertisers Service Department

which has suggestions for every advertising client. We shall be glad to tell you how much we can be of service to your organization.

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C. D. Thomson, London Rep.

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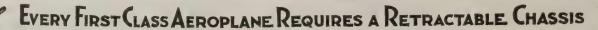
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EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS 11

Chassis

No other light scout of low horsepower can even approximate the performance of the K 3 for the following reasons:

- 1—The Retractable Chassis, protected by both basic and improvement patents for any shape, or method of retracting, eliminates 17% of the useless or parasite resistance.
- 2-The K-bar Truss, acknowledged by the British Air Board to be the only rigid single lift truss, eliminates half of the useless or parasite cellule resistance.
- 3-The Martin form of wing end, proved both in America and Europe, the most efficient
- 4-The Shockabserbing Rudder which simplifies rudder bracing and control provides exceptional taxing manoeuverability and eliminates the Parasite resistance of the usual
- -The Wing end Aileron, proved by actual tests in full flight to be four times as efficient as the trailing edge aileron, leaves the K 3 wing aerofoil unimpaired.
- -The structure of the K 3 has a tested safety factor of eight and weighs complete with motor only 350 lbs. (Compare this with the weight of other 40 h.p. scouts.)

Exclusive manufacturing rights for a similar commercial plane designed around a reliable 40 h.p. American motor for sale for 5% of the gross sales.

CAPT. JAMES V. MARTIN, U. S. Master Mariner and pioneer aeroplane builder who originated and demonstrated in 1911 the modern tractor biplane in all its essential features, such as interconnected trailing edge ailerons, tail decalage and a modern type fuselage with clamp longeron fittings.

All the Martin devices are freely at the disposal of the U. S. War Department and can be used on reasonable terms by other constructors.

Designers and Contractors to U. S. Air Service.

# Martin Aeroplane Factory, Elyria, Ohio

Business Address: Reibold Building, Dayton, Ohio

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

### (Continued from page 503)

tained by quenching alone; an alloy immediately after quenching is not harder than originally, but increases in tensile strength and hardness with time, such that after a period of several days an increase of from 10 to 30 per cent in hardness may be obtained.

Until the present investigation the status of the heat treatment of aluminum alloys has remained as Wilm left it, with no further attention to the effect which variation in heat-treating conditions, quenching temperature, time and temperature of "ageing," temperature of quenching medium have upon the physical properties produced.

Of the many interesting facts which have been disclosed

upon the physical properties produced.

Of the many interesting facts which have been disclosed by this investigation, the following seem to be the most important from the practical standpoint:

The physical properties which are obtained from heat treatment, consisting of quenching and ageing, are dependent upon the conditions under which this heat treatment is carried out. The general method described originally by Wilm and patented by him is not the most satisfactory method of heat treatment of aluminum-magnesium-copper alloys. A much better heat treatment consists in the quenching of the material better heat treatment consists in the quenching of the material from a temperature varying from 510° C. to 520° C. in a bath at a temperature of from 100° C. to 150° C. and ageing prefat a temperature of from 100° C. to 150° C. and ageing preferably in this bath at the same temperature for from 10 to 15 hours, or at ordinary temperature for three or four days. By this treatment better physical properties are secured and with less loss of time during ageing. The tendency of such alloys to crack during quenching is also lessened by quenching to 100° C. instead of to 20° C.

### IV. Further Investigation of the Heat Treatment of the Duralumin Type of Aluminum Alloy

The object of this work was to establish further the laws of the effect of varying heat treatment conditions—quenching temperature, time and temperature of ageing, on the physical properties of duralumin, and to determine the best practical conditions for this heat treatment. The results justify the following conclusions:

- (1) There is not in the case of the duralumin type of alloy, as there is in the case of steel, a definite quenching temperature which marks the limit of the property of the material to harden; duralumin may be hardened by quenching (followed by ageing from temperatures varying from 250° C. to 520° C., and the hardness obtained by quenching from these temperatures increases uniformly as the quenching temperature increases, reaching a maximum at the latter temperature.
- (2) Duralumin, on the other hand, is similar to steel in (2) Duralumin, on the other hand, is similar to steel in the fact that the tempering of it or ageing after quenching is determined by two factors: time and temperature. A temperature of 150° C. marks what may be called a critical temperature with respect to the ageing of duralumin; i. e., above that temperature continued ageing may cause a decrease in hardness after the maximum hardness is attained, whereas below that temperature no such subsequent decrease. whereas below that temperature no such subsequent decrease of hardness occurs. The lowest temperature at which the maximum hardness may be obtained is approximately 125° C.

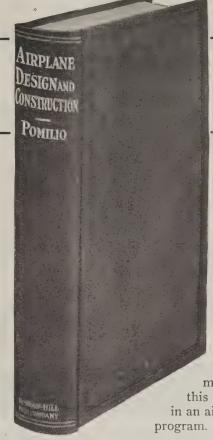
(3) The rate of increase of hardness with time upon ageing is roughly proportional to the temperature of ageing.

- (4) The period of time of holding the specimen at the quenching temperature before quenching has but an inap-preciable effect on the properties obtained; on the other hand, an improvement in the hardness of specimens quenched from temperatures below from 500° C. to 520° C. is obtained by preheating them before quenching to the latter range of temperature. Specimens held for 21 hours at the higher quenching temperatures before quenching (515° C. to 525° C.) were blistered with consequent decrease in hardness.
- (5) Heating the material above 520° C. is generally detrimental; the material usually blisters and an oxide layer is formed on the surface.
- (6) The following tensile properties have been obtained on rolled sheet of the above composition:

Tensile strength	Proportional limit.	Elongation in 2 inches
Pounds per sq. in. 60,000 60,000	Pounds per sq. in. 40,000 30,000	Per cent.

These properties may be obtained by quenching from 515° C. followed by ageing for one week at from 125° C. to 150° C., depending upon whether a high proportional limit with low ductility is desired (ageing temperature of 150° C.) or the converse.

# The Pomilio's latest data are given in this book



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In 1918, by special request of the United States Government, they came to this country to assist in an aircraft production

# AIRPLANE DESIGN AND CONSTRUCTION

By OTTORINO POMILIO

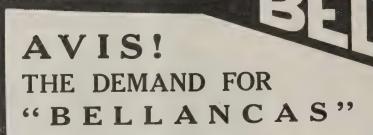
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The publication of this book now—when the airplane industry is shifting from the design and construction of military types of craft to that of pleasure and commercial types—should go far toward replacing by scientific procedure many of the "cut and try" methods now used.

This is the first book to be published in this country which presents in detail the application of aerodynamic research to practical airplane design and construction.

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# Use Aeroplane to Find Wire Trouble in Panama

Telegraph "trouble hunting" by aeroplane is perhaps a new feature, but it certainly is efficient. Friday, June 13, Major Prescott flew to San Carlos, about fifty miles south of Balboa, in an N-9 seaplane, piloted by Lieutenant J. R. Duggan. The trip down was made in forty-five minutes and they landed on the beach about a mile from town. The natives met them with horses, on which they rode into the town. Major Prescott found and remedied the "break" in about an hour, after which they walked over the village and then rode back to the beach. The return trip was made in forty minutes, Lieutenant Duggan landing Major Prescott in the Canal Channel near the dry docks before returning to this field. The round trip took one and one-half hours by plane, whereas it would have taken three days by horseback—the only other way of reaching San Carlos save by boat. Lieutenant Duggan reports a good landing beach most of the way along the coast, and several apparently level plateaus that may be possible landing places for land planes. The natives are intelligent, but speak Spanish only.

Friday afternoon the Commanding Officer started for Department Headquarters at Balboa in a De Haviland 4, piloted by Lieutenant R. C. W. Blessley. About half way across the Isthmus they ran into a rainstorm that was a veritable cloudburst. One does not dare to fly by compass when out of sight of the ground in this country, as with the slightest deviation one would be hopelessly lost over these mountains and tropical jungles. After holding to the course for about ten minutes and still failing to clear the

storm, Lieutenant Blessley turned back and throttled into a glide. To show the tremendous quantity of water suspended in these clouds, it might be mentioned that Captain Boland jokingly remarked afterward that during this glide he was not sure whether they were still in the air or diving through Gatun Lake. Lieutenant Blessley said that if he had had a seaplane he would have landed right there in the clouds and waited for the storm to clear up. On emerging into the open they returned to the aerodrome. The paint and dope had been removed from the leading edges of the planes and empanage as if by intention, and the fabric covering on the propellers stripped off clean.

Oblique pictures of the Chagres Batteries, Gatun Locks and Spillway, Fort De Lesseps, Pacific fortifications and canal approaches, Miraflores Locks and Spillway, and a mosaic of Balboa showing the causeway to the island forts were made during the week. A Curtiss flying boat of the HS2L type is being used for this work. On the return from one of these trips Lieutenant C. B. Assting, the pilot, observed a steamer aground in the canal, which fact was made known to the captain of the port immediately upon landing

# Associate Physicist Qualified in Aeronautics

Washington, D. C.—The United States Civil Service Commision announces an open competitive examination for associate physicist qualified for aeronautics. A vacancy under the National Advisory Committee for Aeronautics, for duty at Langley Field, Va., at \$3,000 a year, and vacancies in positions requiring similar

qualifications, at this or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

ment, transfer, or promotion.

Both men and women, if qualified, may enter this examination, but appointing officers have the legal right to specify the sex desired in requesting certification of eligibles. For the existing vacancy male

eligibles. For the existing vacancy male eligibles are desired.

It will be the duty of the appointee to carry on wind tunnel experiments and write reports on such experiments.

write reports on such experiments.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated, on a scale of 100: (1) Physical ability, 10; (2) Education and experience 90

(2) Education and experience, 90.
Competitors will be rated upon the sworn statements in their applications and upon corroboarative evidence

upon corroboarative evidence.

Applicants must have graduated with a B. S. degree from a college or university of recognized standing. In addition, they must (a) show by statement from the proper college authorities that their course included a course of not less than three months duration in aeroplane design and aerodynamic laboratory; or (b) have had six months' experience in the operation of wind tunnels and in the design of apparatus for use in conjunction with wind-tunnel experiments. Special consideration will be given for advanced work in physics and for experience in writing for publication on physical and technical subjects.

lication on physical and technical subjects.
Applicants must be between 22 and 45

Photographs and military discharge shall accompany application. Examinations can be undertaken at any Civil Service Board office.

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#### Rogers Aircraft Magneto Radical Departure in Design

Cleveland, Ohio.—A magneto which meets all the requirements of engines with from twelve to sixteen cylinders and increases the magneto area from 200 to 300 per cent. is offered in the design of the Rogers magneto, which is to be manufactured by an ignition concern here.

The Rogers has no moving wires or revolving armature; the breaker is of original and exclusive design; condenser is puncture-proof-pitting eliminated; a hotter spark because of the manner in which the voltage and amperage is built the interpretation of the manner of t up in the magneto field; coil is water-proof-and the complete device is accessible and extremely simple.

A striking feature of the 12-16-cylinder A striking feature of the 12-16-cylinder type is the fact that this two-pole type gives four sparks for each revolution of the rotor. This means that the Rogers magneto produces 40,000 sparks per minute at 10,000 revolutions per minute of the rotor shaft; the two-spark type for 12-16 cylinders produces 80,000 sparks per minute at the same rotor speed. The two-spark Liberty motor type produces 120 produces spark Liberty motor type produces 120,-000 sparks per minute at same speed.

recent government tests made in Washington attempts were made to short circuit the Rogers by driving nails through the condenser. The magneto continued to function properly as it did after chunks had been cut from the condenser. denser.

An exclusive process of impregnating coils makes them moisture proof. This feature has been proven by submerging the coils in water for a week and, at the of that time, they were torn down

This magneto is designed by George D.

Rogers, who has for years made a special study of ignition systems for the internal combustion engine. Mr. Rogers was successively production engineer for the Peerless Motor Car Co., Winton Co. and the Continental Motors Co.

#### Wire Wheel Makers Combine

Wire Wheel Makers Combine

Detroit, Mich.—A merger of several prominent wire wheel manufacturers to form a \$20,000,000 corporation is being considered here. The Hayes Wheel Co., of Jackson, Mich., the Prudden Wheel Co., the Auto Wheel Co., of Detroit, the Gier Pressed Steel Wheel Co., of Lansing, the Hayes Motor Truck Wheel Co., of St. John, the Imperial Wheel Co., of Flint, the Pioneer Pole and Shaft Co., of Piqua, Ohio, and the Weiss & Loesch Co., also of Piqua, Ohio, are among the manufacturers conferring on the project. The also of Figura, Onto, are among the manufacturers conferring on the project. The Hayes Wheel Company is to form the nucleus of the combination. The Pioneer Shaft and Pole Company is one of the largest spokemakers in the country. The Continental and Commercial Securities Company of Chicago are said to be presented to underwrite the stock. pared to underwrite the stock

#### Boyce Forms New Fire Extinguisher Company

Long Island City, N. Y.—Harrison H. Boyce, of the Moto-Meter Company, Inc., Long Island City, N. Y., has formed a new company, the name of which will be the "Boyce-Veeder Corporation", having its footward office in Long Lity. the "Boyce-veder Corporation", having its factory and office in Long Island City, for the marketing of an automatic and hand operated fire extinguisher especially applicable to motor cars, trucks, tractors, aeroplanes, and other automotive vehicles.

The new company will operate under the "Erwin" patents, and the device is

said to be of a very novel and most

said to be of a very novel and most meritorious nature.

Associated with Mr. Boyce will be Paul L. Veeder, an attorney well known in both New York and Chicago.

Offices have already been opened in the Queens Subway Building, Long Island City. It is stated that production will be in full swing January 1st.

# Automotive Metals to Be Sold By Materials Disposal Section

Washington.—Large quantities of metals are for sale by the Material Disposal Division of the Air Service. Included are thousands of pounds of seamless brass tubing, several hundred thousand pounds of chrome nickel steel bars, aluminum ingots, chrome vanadium steel bars, chrome nickel steel bars, bronze bars and hundreds of pounds of copper tubing and hundreds of pounds of copper tubing.

Complete information as to quantities location, dates of sale, etc., can be secured from the Material Disposal Division of any District Bureau of Aircraft Production at Boston, Buffalo, Chicago, Dayton, Detroit, New York or San Francisco.

# Plot Purchased for Aerial Service Station in Buffalo

Buffalo, N. Y.-Mr. E. H. Baker, president of the Automobile Dealers' Associadent of the Automobile Dealers' Association, the Karge-Baker Corp. and the Cole Motor Car Company has purchased a fitteen-acre plot as a parking place and service station for commercial aeroplanes, It was originally purchased as a site for a flexible steel coupling plant to be erected by the Karge-Baker Corporation but this by the Karge-Baker Corporation but this plant may be built elsewhere in order to permit the establishment of the commercial aerodrome.

# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"-left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



514

Cleveland to Washington	350	miles
Washington to New York and return (four times)	450	miles
Washington to Macon and return Washington to Dayton and return	1260	miles
(two times)	1000	miles
Washington to Langley Field and		

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

# The Glenn L. Martin Company

Contractors to the U.S. Army, Navy and Post Office Departments,

FIRST IN WAR

FIRST IN PEACE

# Quality Tells in the Long Pioneering Flights

The American-French Aero Exposition, Inc., announces that it has purchased

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A big national advertiser will put one of the biggest advertising coups over when the first commercial liner jumps from New York to San Francisco, if he negotiates an arrangement to have a thousand aerial messages dropped over every important city enroute. We have scores of suggestions as to how this should be done, and we are closely in touch with the projected plans for Trans-Continental air trips, and the possibilities of utilizing them for aerial advertising.

Furthermore, there are scores of exhibition and passenger carrying services organized throughout the country that we can link up to your advertising department. Just tell us your business and we'll map your plan.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to Aerial Routes in the United States furnished on application.)

# AERICAGE WEEKLY

Vol. 10, No. 14

JANUARY 19, 1920 UNIVERSITY OF ILLINOIS LIBRARY CENTS A COPY

JAN 19 1920



The Farman Goliath Sixteen-Passenger Aerial Cruiser

2000 Planes Sold at Chicago Aero Show



# ///////

THE new world's altitude records for triplanes and seaplanes, established by Roland Rohlfs and Caleb Bragg during 1919, have emphasized the superiorities of AC Aviation Plugs. For no flight of the airplane imposes a more terrific strain on spark plugs than the long, steady climb, through constantly changing densities and temperatures, to unexplored heights.

Champion Ignition Company, FLINT, Michigan

#### These manufacturers use AC Spark Plugs for factory equipment

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Cole
Comet
Comet
Commonwealth
Conestoga Trucks
Continental Motors
Crane-Simplex
Daniels
Davis
Defiance Trucks
Delco-Light
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Dong Brothers
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Pumping Engines
Dort
Duesenberg Motors
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Hall Trucks
Hartfield
Haynes
Herschell-Spillman
Hispano-Suiza
Holt Tractors
Howell Tractors
Hudson
Hupmobile
Hurlburt Trucks
Independent Trucks
Kalamazoo Trucks
Kearns Trucks
Keant ConcreteMixers
Keystone Trucks
Kent ConcreteMixers
Keystone Trucks
Kent ConcreteMixers
Keystone Trucks
Kent ConcreteMixers
Keystone Trucks
Kent Trucks
Ken

Maxim Fire
Trucks
Mayrag
Motors
Michell
Moline-Knight
Monroe
Moreland Trucks
Napoleon Trucks
Napoleon Trucks
Nash
National
Nelson
Trucks
Neson & Le Moon
Trucks
New Britain Tractors
Noble Trucks
Oakland
Old Reliable Trucks
Oddsmobile
Oneida Trucks
Owens Light &
Power Plants
Packard
Paige
Fan
Pan-American
Parker Trucks
Paterson

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Partiot Trucks
Peerless
Perfect Power
Sprayers
Phlanna
Pierce-Arrow
Pilot
Pioneer Tractors
Porter
Premier
Ranger Trucks
Red Wing Thorobred
Motors
Reo
Re Vere
Riker Trucks
Roamer
Roberts Motors
Robinson Fire
Trucks
Rock Falls
Rowe Trucks
Rutenber Motors
Samson Tractors
Samson Trucks
Sanon
Trucks
Saxon
Scripps-Booth
Scripps-

Patriot Trucks

Stanwood
Stearns-Knight
Stearns Tractors
Sterling Engines
Sterling Engines
Sterling Trucks
Stewart Trucks
Stoughton Trucks
Stoughton Trucks
Stullivan Trucks
Super Trucks
Super Trucks
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Trucks
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Trucks
Trigan Trucks
Universal Trucks
Ward La France
White Hickory
Trucks
Wisconsin Motors
Wisconsin Motors
Wisconsin Motors
Wolverine Tractors

U. S. Pat. No. 1,135,727, April 13, 1915, U. S. Pat. No. 1,216,139, Feb. 13, 1917, Other Patents Pending.

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AERIAL AGE
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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

Published weekly by THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City Washington Office: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., January 19, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, JANUARY 19, 1920

NO. 14

# 2,000 PLANES SOLD AT CHICAGO SHOW!

ON January 12 the newspapers printed the following item: Chicago, January 11.—What is said to be the world's largest sale of commercial aeroplanes was made at the aeronautical show to-day, according to an announcement tonight. One company sold 440 "ships" to B. L. Brookins, of Tulsa, Okla., for \$2,200,000.

An official of the aeroplane company, who closed the deal with the Oklahoma man, said aeroplanes are in great demand in the oil fields, the operators using them to reach new fields when a "strike" is made.

Directors of the show estimated the total sales of the week at 1,700 planes.

As some of the newspaper editors expressed it, it would have been most impressive even if only one-tenth that number of machines had been sold, because the aeronautic movement during the past year has consisted of a few progressive firms and the forceful and substantial support of the Aero Club of America, the Aerial League of America and the affiliated Aero Club, and Flying, Aerial Age Weekly and Air Power.

These institutions have had to contend with a group of gloomy pessimists who have been obstructing the progress of aeronautics with their destructive attitude towards civilian aeronautics.

As was shown in the remarkable report of the commissions which investigated aeronautic interest and the demand for aircraft in the United States, Europe, South and Central America and Japan and China, the demand for aircraft is tremendous and the American market will easily take ten thousand aeroplanes this year.

#### Only Danger Is That Industry May Not Prepare To Meet Demand

The only danger is that the manufacturers may not prepare to meet the extensive demand. Such was the case during the past year, and civilian aeronautic activities were greatly restricted because people could not get deliveries of aeroplanes, motors and accessories.

The fact that over one thousand aeroplanes were sold during the year was pleasing, but it was a pity that the entire demand could not be met.

#### Wright-Martin's Inability To Supply Hispano-Suiza Motors For Civilian Purposes

The editors of Aerial Age have had repeated experiences such as referring customers to the Wright-Martin Corporation for Hispano-Suiza motors and being told that that firm could not supply motors for civilian purposes!

In one case recently a customer wanted four 320 h.p. Hispano-Suiza motors and was told that the Army was taking the entire output! We shall have more to say about this preposterous situation in coming numbers, when some "striking" Washington reports and expressions from Congressmen will be printed.

# How American Aircraft Manufacturers Are Losing Opportunities in South and Central America

How American aircraft manufacturers are losing opportunities in South and Central American trade is told in the New York *Commercial* by the noted business investigator, John F. Barry, who has just returned from an eight thousand-mile survey through the Latin-American countries. Dealing with aeronautics, he writes:

"The air is an excellent field for 'commercial propaganda' today. Each successful flight made from one country to another is telegraphed around the world, and is excellent 'advertising' for the country to which the flyer belongs. Europe is turning the air to commercial news at an amazing speed; each week we hear of new record-breaking flights, of commercial lines being opened up in France, Great Britain, Germany, Italy and other countries. The United States lags behind. Why does not some patriotic and enterprising American manufacturer offer a large prize for the first air flight from the United States to Brazil? It would be hard to find a more peculiarly suitable method of disseminating a little favorable 'commercial propaganda'; it would show our Southern friends that there are aeroplanes and aviators in the United States-something which many people down there have reasons to doubt. Santos Dumont, the famous Brazilian pioneer flying-man, returned to Rio recently from the United States, and expressed unbounded surprise at the lack of interest being shown by Americans in the commercial possibilities of the air. He had expected the reverse.

"European aeroplane manufacturers are establishing regular commercial air lines in many South American countries; I have heard of such activities in Peru, Chile, Southern Brazil, Argentina. In French Guiana a French company has initiated services for passengers, mails, and valuable freight on the great rivers of that out-of-the-way section, with hydroaeroplanes supplied by the French Government.

"There are immense possibilities for the use of hydroaeroplanes on the Amazon. Probably no region in the world offers greater opportunities, more especially today when the entire valley is on the eve of an era of industrial activity. The great rivers, with many miles of water surface, offer safe places everywhere for making landings or take-offs.

There are no great storms or fogs, and aviators would not have to wait at any time, as every day is 'good flying weather' on the Amazon, except perhaps for about three months each year during the rainy season, when the afternoons have heavy tropical downpours of rain.

"The towns and cities are hundreds, often thousands of miles apart; it would be of incalculable benefit to cities like

*528* 

Para and Manaos, for instance, if a fast mail and passenger service were available; it would greatly help business development, as instead of the merchants being compelled to wait for weeks for a reply to an important business letter, they could get a reply back in a few days. Such a service could

be conducted with a minimum of risk or danger; the rivers are broad, stations could be established at strategic points, there is a submarine telegraph between Para and Manaos, with telegraphic stations at many points along the bank of the river, and there are wireless stations at half a dozen points in the valley.

"An American commercial hydroaeroplane service on the Amazon would mean much for that region, and it would bind the more closely the friendly commercial relations of the two greatest American republics. I venture to prophecy that there will be air machines—of some nationality—on the Amazon within twelve months."

#### THIRD PAN-AMERICAN AERONAUTIC CONGRESS TO BE HELD AT ATLANTIC CITY IN JUNE, WITH AERIAL TOURING CON-GRESS, INSTEAD OF HAVANA

WING to transportation difficulties caused by the transportation and labor strikes which have held up shipment of French, British and Italian planes destined for Cuba, and the threatening labor strike in Cuba, it has been decided to hold the Third Pan-American Aeronautic Congress at Atlantic City, with the Aerial Touring Congress instead of Havana.

#### French, British and Italian Exhibits Delayed

Mr. Hannibal J. De Mesa, the Cuban Sportsman who bought four sixteen passenger aeroplanes in France to establish an air line between Havana and Key West is still awaiting the arrival of the planes from France—where he bought them because he was unable to get deliveries from American manufacturers. The planes and accessories when crated are very bulky and it has not been possible to get them shipped although he is advised every few days that they expect to ship them on one ship or another.

The three French Aces and a dozen French mechanics have

been at Havana six weeks waiting for the planes.
Other British, French and Italian Aircraft manufacturers who planned to send exhibits to Havana for the Congress find the same difficulty in shipping their aircraft. They will have time to ship them to the United States for the Atlantic City Congress.

#### Lack of Aerodromes in U. S. Prevent Flying Planes in Havana

Lack of suitable aerodromes in the United States on the way to Cuba prevented the large 20 passenger Lawson Aerial Pullman and the Handley Page from being flown to Havana for the Congress. The lack of suitable aerodromes for large planes at Key West has also made Mr. Hannibal J. de Mesa decide to establish his first aerial transportation line between Havana and Cienfuegos instead of Havana to Key West.

It is hoped to arrange for aerodromes by June so that Mr.

de Mesa's aeroplanes can fly from Havana to Atlantic City during the Congerss.

#### U. S. Government Also Forced to Postpone Pan-American Financial Congress Because of Transportation Difficulties

The U. S. Government has also been forced to postpone the Pan-American Financial Congress on account of transportation difficulties which exist the world over.

As thirty-two countries are scheduled to send commissions

to the Congress, and these commissions would start for

Havana in the next week, it was decided best not to take a chance in having them start and then have to change the plans. Under the new arrangement the Congress will be held at the Atlantic City Steel Pier in June, where the Second Pan-American Aeronautic Congress was held last year and the races will start from the Atlantic Airport.

First Annual Touring Congress to Be Held at Atlantic City

Will Open Aerial Touring Activities

An international congress, at which every phase of aerial touring and aerial navigation will be discussed by the world's aeronautic experts is being organized by the Aerial Touring Association.

Major Charles J. Glidden, noted originator of the famous Glidden Automobile Tours, who is president of the Aerial Touring Association, has offered a trophy for aerial touring and arrangements are being made to start the aerial tours in June, and continue them weekly throughout the summer, the tours to consist of cross country flights of from 250 to 3,000 miles with stops, conducted on the same principle as the automobile tours.

In view of the great interest shown in the proposed aerial tours in the United States and Latin American countries it has been decided to hold an international aerial touring congress, to bring together the world's aeronautic experts to dis-

cuss the various aspects of aerial touring and aerial navigation.

The Atlantic City Steel Pier has been engaged for the Congress which is to be held during the first two weeks of

Tune.

The Aerial Touring Association has offices at 280 Madison Avenue, also has offices in Washington, San Francisco, Atlantic City, Paris, Havana, Cuba and Rio de Janeiro,

Avenue, also has omces in Washington, San Francisco, Atlantic City, Paris, Havana, Cuba and Rio de Janeiro, Brazil, and Tokio, Japan. Major Glidden, the president and Commodore Louis D. Beaumont, vice-president of the association are at present at Shanghai, China, making arrangements for both the First Aerial Derby Around the World and the aerial tours around the world which are to follow.

The officers of the Aerial Touring Association are: President, Major Charles J. Glidden, noted creator of the Glidden Automobile tours; Vice-Presidents, Commodore Louis D. Beaumont, Major Thomas S. Baldwin, Albert T. Bell, Lieut. Godfrey L. Cabot, U. S. N., Major Albert B. Lambert, U. S. A., Earle L. Ovington, Major Albert B. Lambert, U. S. A., Alberto Santos-Dumont, Major Redondo Sutton, M. A., Richard Wightman, Henry Woodhouse, Lieut. Col. Charles Elliott Warren; Secretary, Harry B. Coòk; Flight Directors and Secretary, Major Reed G. Landis, Medical Advisor, Brigadier General Theodore G. Lyster, U. S. A. M. C. (retired); Insurance Advisor, Charles H. Payne, the (Continued on page 544)

#### THIRTY-FOUR COLLEGES WILL BE REPRESENTED IN CONTESTS FOR SEVEN INTERCOLLEGIATE TROPHIES

May Also Compete in National and International Contests-\$5,000 Valentine Victory Bonds Offered As Prizes

HIRTY-FOUR colleges will be represented in the contests for the six intercollegiate aeronautic trophies and \$5,000 Victory Bonds will be offered by the Aero Club of America under the terms of the will of Mr. Samuel H. Valentine to be converted into plate, if necessary to comply with the rules of amateur contests.

The six trophies which were offered last year by the Aerial League of America, of which Rear Admiral Robert E. Peary is president to be competed for annually are:

The Intercollegiate Aeroplane Speed Trophy,

The Intercollegiate Cross Country Flying Trophy,

The Intercollegiate Seaplane Trophy,
The Intercollegiate Seaplane Speed Trophy,
The Intercollegiate Dirigible Trophy,
The Intercollegiate Dirigible Trophy,
The Intercollegiate Free Balloon Trophy.
These trophies are to be the property of the colleges that

win them three years in succession.

Four contests for the Aeroplane Speed Trophy and Seaplane Speed Trophy were held at Atlantic City last May. As the war was just over the colleges had been unable to ac-(Continued on page 547)



# THE NEWS OF THE WEEK



#### Weekly Atlantic Airship Service Projected by British Firms

London.—A weekly trans-Atlantic airship service is proposed by a group of steamship owners, airship building companies, business, engineering and transport service firms, who are combining to buy or lease all the airships which the Government does not intend to retain. British firms understood to be interested in the project are the Armstrong-Whitworths, Bearmores, Vickers, Shortts and Marconis, and they are in negotiation with important American interests which are expected to cg-operate with them. They also plan to start a commercial air service to Scandinavia, Holland and Spain, and begin an air service in the British Isles on the shorter coastal routes.

The formation of this airship group is the result of a conference held last summer between the Air Ministry of this country and a number of leading business men. The whole question of air navigation was considered, and the Government explained its own position in the matter and what it wished to do with the airships already in existence and under construc-

tion

The Government is keeping two airships, presumably two of the largest type. It has sold the R-38 to the United States, but there are still the R-80 and some units of the R-34 types, and a number of semirigids, Northsea and Evastal airships, that the combine can secure. It is reckoned that for the transatlantic and Continental service there should be about half a dozen big rigids available, while smaller fry may be used for the short coastal trips.

Experimental trade trips will be made first. Although the R-80 is complete in framework construction, she is awaiting her engines. Either this vessel or one of the R-34 type is likely to be used on the regular London-Paris route.

Routes have been planned so that no important city will be more than ten days' air journey from London, the following being the chief main lines and times occupied in making flights from London:

Cupied in making flights from London:

London to Miles, Days.

New York 3,000 2½

San Francisco 6,200 4½

Cairo 2,050 1½

Colombo 5,450 4½

Perth (Australia) 8,600 7

Nairobi 4,150 2½

Capetown 6,350 5½

The trip from London to Capetown will include a twelve hour stop at Nairobi. Cairo and Lisbon are to be two of the traffic junctions, the former, which will be reached from London by way of Tunis, for the southern route to Captown by way of Nairobi, and for the eastern route to Sydney by way of Aden, Colombo and Perth. West of London the first stop is to be at Lisbon, whence the trip to New York and San Francisco will proceed by way of the Azores, and to Rio de Janeiro by way of Sierra Leone.

by way of Sierra Leone.

It is pointed out that while the speed of airships is less than that of aeroplanes it is five times greater than that of the average ocean liner, and a non-stop flight up to 10,000 miles is possible. The proposed fares from London will be: To New York, \$243; to Capetown, \$876, and to Australia, \$696. This is approximately eight cents a mile. Mail will be carried at six cents an ounce.

Canada Plans Air Service in Mountains

Calgary, Alberta—Establishment of an air service in the Rocky mountains, by means of which government work, such as police and forestry patrols, surveying and photographing, can be carried on economically, is under consideration here. It is proposed to operate from the international boundary to Fort Vermilion. A string of aerodromes along the east slope of the Rockies is part of the plan.

#### Prof. Todd to Attend Air Congress.

Professor David Todd, Director of the Observatory at Amherst, has accepted the invitation of the Liga Aerea de Cuba to visit Havana as a guest of the league during the Pan-American Aeronautic Congress and Exposition in Havana February 21 to March 1.

#### Cliff Durant to Fly for Alaskan Prize

Seattle, Wash.—Cliff Durant, aviator and automobile race driver, probably will enter an air race between Seattle and Alaska planned for next spring it was announced here.

Captain Sir Arthur Whitten Brown, non-stop trans-Atlantic flyer, several days ago wrote that he probably would enter.

The aero club of the Northwest which is arranging for the race, has received inquiries from several other aviators.

A capital prize of \$25,000 probably will be offered.

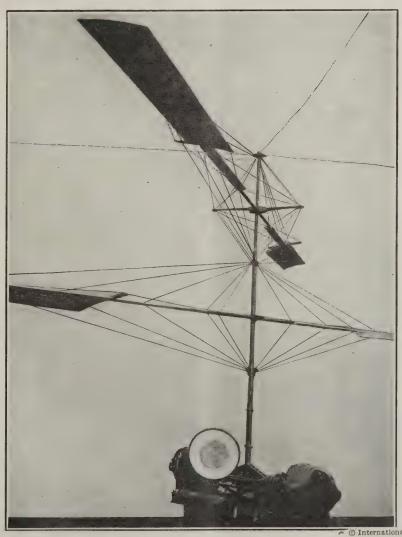
#### Merger Plan Completed

It has been announced that the plan of the International Motor Truck Corporation to take over the New Brunswick (N. J.) plant and other assets of the Wright-Martin Aircraft Corporation, amounting in value to approximately \$8,000,000, has been consummated and that the temporary certificates covering the first and second preferred and common stock will be issued soon. These certificates will be sent out by the Equitable Trust Company to Wright-Martin shareholders who have deposited their holdings with that company.

shareholders who have deposited their holdings with that company.

When the consolidation of these companies is completed the International Motor Truck Corporation will have a capital of approximately \$10,900,000 in first preferred, \$5,350,000 in second preferred and about 80,000 shares of no par value common stock. An application, it is said, is shortly to be made to have all three classes of stock listed on the Stock

Exchange.



The Helicopter designed and invented by Professor Francis B. Crocker and Dr.
Peter Cooper Hewitt, which is arousing great interest in aeronautic engineering circles

Cleveland Aviation Club Annual Ball

The Cleveland Aviation Club have sent out invitations to their first annual ball which is to be held on the evening of January 31, at the Hotel Statler, Cleveland at 8:30. The directors have requested that uniform be worn wherever The function bids fair to be possible. one of the most successful social events of the season as a large number of people of the season as a large number of people prominent in military and aviation circles have already accepted the invitation to be present. Among those, outside of Cleveland, who have been invited are: Hon. Newton D. Baker, Secretary of War; Hon. Josephus Daniels, Secretary of the Navy; Hon. Benedict Crowell, Hon. Otto Praeger, General Menoher, D.M.A.; Brig.-Gen. Wm. Mitchell, Gov. James C. Cox, Senator Warren G. Hard-ing, Senator Atlee Pomerene, Hon. H. I. Emerson, Representative F. H. La Guardia, Lawrence T. Driggs, Rodman Wanamaker, Air Commodore L. E. C. Charlon, Capt. Guy deLavergne, Lieut. Com. Albert C. Reid, Commander John H. Towers, Major Reed K. Landis, Col. W. J. Parker, Capt. E. V. Rickenbacher, J. Parker, Capt. E. V. Rickenbacher, Glenn Curtiss, Orville Wright, Capt. Alex Preason, Lieut. Belvin W. Maynard, Maj.-Gen. Leonard C. Wood, and many others

#### Farming in 1920

According to the Fort Dodge Messenger and Chronicle, J. F. Bradshaw, a farmer who lives at LaHavre, Ill., is nothing if not up to date. It appears that Bradshaw was an Army aviator duration. ing the late unpleasantness. He has now returned to his farm in LaHavre, but the habits contracted in the Air Service are not so easily shaken off. For that reason and because he is a firm believer in the utility of aircraft in business, he has got himself an aeroplane which he uses not only for pleasure flights, but also to bring to the farm things urgently needed. An instance occurred sometime ago when, during the late harvest season, he was able to replace some broken machinery parts, the lack of which was holding up harvest ing operations on his farm, by flying to the nearest town where the parts could be purchased and returning within the space of two hours.

#### Mapping of Aerial Routes

The Secretary of War has informed the Chief of Engineers and the Director of Air Service that the Engineer Corps is responsible for the preparation and production of aerial route maps and that it will be guided in such work by the technical requirements of the Air Service. The Air Service is responsible for securing and furnishing such aerial data as may be needed, and the two services will confer in working out the principles and methods of producing aerial route maps, with a view to securing a satisfactory route map before any general aerial mapping project is decided upon.

#### Louisville Becoming National Air Center

Louisville, Ky., a city where an aeroplane was an event a year ago is said to have had one of the most rapid growths of the aeroplane industry in the history of the South. The location of Louisville as the Gateway of the South has led several Aeroplane Companies to seek sites

there for a landing field.

The Kentucky Aeroplane and Supply Company is the first of the private interests to establish a flying field at Louis-ville. Their field, Hubbard Field, recent-ly established, is located slightly over a mile east of the city and is fully equipped with Hangars, resting room and every convenience for flyers. The Company has also established an aeroplane factory near there. The personnel of the Company includes, S. E. Hubbard, President; W. A. Hubbard, General Manager; Billy Brock, Phil Ringel, D. D. Gray, Bob Gast, Robert Moody.

#### Gift of \$1,000 By Anna Gould Aids Our Airmen in Poland

Paris.-The Kosciusko Squadron of American aviators on the Polish front have found a needed godmother in the Duchess de Talleyrand, formerly Anna Gould, of New York. The Duchess has presented 5,000 francs to the squadron.

The pilots receive only \$25 monthly and their food, and their winter clothing, therefore, was deficient. When volunteering for the squadron the Americans declined the offer of the Poles of greater pay, saying that they would take only the amount the Polish aviators received.



Pauline Frederick, just previous to her flight over the Goldwyn studios at Culver City, Cal., in an aeroplane piloted by G. B. Manley

#### Winter Flying in Maine

To encourage winter flying in Maine, Harry M. Jones, chief pilot of the Old Orchard Beach Flying School, has been serving coffee and hot lunches to his prospective passengers. Instruction as well as passenger flights are being carried on all this winter. The management of the school finds that this is possible notwithstanding the falls of snow which have ocin the vicinity of the school, by using the sandy beaches at low tide as a landing field. They also have landed successfully on the frozen surfaces of inland

# D'Annunzio May Stake Out Rome-Tokio Air Race Course

London.—A Caproni aeroplane left Rome on January 9 to stake a route to be covered in the Rome to Tokio flight which is being arranged and financed by the Italian Government. The plane was said to have reached Avlona and to have departed immediately for Saloniki.

#### The Helicopter

We are in receipt of the following communication from Professor Francis B. Crocker, and are glad to invite the suggestions of our readers:

To the Editor of the Aerial Age: Sir: The name of the type of aircraft—Helicopter—which Dr. Peter Cooper Hewitt and the writer have recently demonstrated to be practicable is unfortunately long and

difficult to pronounce.

difficult to pronounce.

The name is derived from the Greek words "Helix" and "Helicos" a spiral and "Pteron" a wing; that is, a spiral wing. The word is sometimes abbreviated as "Heli" or "Helli" of "Helio". The first is apt to be mixed up with "Helios" the Greek for sun from which the name of the flower heliotrope is derived. The same is true of "Helio" to an even greater degree. Both words "Helli" and "Helio" are wrong in pronunciation and disagreeable to the ear. The abbreviation "Copter" seems decidedly better both to the eye and to the ear and does not ofeye and to the ear and does not offend common sense or propriety. It is an analogous to phone for telephone and bus for omnibus. Moreover there is even more reason for abbreviating Helicopter because it is longer and harder to pronounce. In fact, almost everyone, not very familiar with the word either hesitates or gets it wrong when he tackles

A new term always has a strange sound that excites ridicule or opposition and generally both, but that disappears in a few weeks. Professor Pupin and I were the first to propose the American name of Henry for the unit of inductance because that phenomenon was discovered by Joseph Henry. At first everyone took it as a joke, and Millihenry the thousandth part of a Henry was regarded as absolutely absurd because it is hermaphroditic, being a combination of female and male names in one word. In a short time people got used to these words and it many years since I have seen anyone even smile at what they used to laugh at long and loud. Copter seems even less laughable and should be taken seriously in a very short time because some abbreviation of the word "Helicopter" is really a necessity and we might get a worse one. The name doughboy for the American soldier is a good example of the worst possible nick-

FRANCIS B. CROCKER. New York, December 31, 1919.



Growth of Aerial Moving Pictures in Industry

The establishment of an Aerial department by the Rothacker Film Company was dictated by grim necessity. It was either that or be content to be away behind the times, so—the department was established. Watterson R. Rothacker, President of the Company, insisted that his company be able to make any kind of picture—educational, industrial or advertising—at a moment's notice. With modern industry what it is, it is practically impossible to make industrial films from the ground. Of course, pictures could be made from the ground, but not the kind of pictures which are demanded by modindustry and modern advertising. These must be taken from the air. reason is not far to seek. The up-to-date manufacturing plant is generally built not more than two storys high, indeed the majority of them are only one story. Therefore they cover a lot of ground, far more than the average person has any conception of. It is manifestly impossible to show the extent of the plants by ground pictures, and in almost every instance there are no high buildings situated in the vicinity of the plants from which satisfactory pictures could be made. Therefore an aeroplane from which the camera can gaze at the plants at every angle, is a necessity of industrial filming.

Industrial moving pictures are rather a new thing, more particularly are they new in Export advertising, yet as the in-ternational distribution of films becomes more and more standardized every day, perhaps no medium of foreign advertis ing sells the parent organization so well as the universal medium of moving pictures. Manufacturers and advertising men are getting to realize this more and more every day, and so they adapt their methods toward selling the name, trademark, or idea of the parent organization not only to the Export field but to the domestic trade and public as well. The domestic trade and public as well. The Rothacker Company is among the pion-eers of this kind of advertising, and they, since they inaugurated their aerial department, have had notable success in filming the plants of the Oliver Type-writer Company at Woodstock, Ill., the Libby, McNeill and Libby plants at Blue Island, and others. A feature of the Libby films is that they will be used at

the Salesmen's District Conventions at several widely separated cities throughout the country

American-French Aero Exposition Purchase Factory at Newark Valley, N. Y.
The American-French Aero Exposition,

Inc., have completed the purchase of a factory on which negotiations have been pending for some weeks, with the objective of manufacturing a medium priced aeroplane.

The factory purchased is situated at Newark Valley, N. Y., and with slight alterations will be an ideal plant for the manufacture of such ships and aeronaumantracture of such sinps and actorial supplies as the company will produce. The factory grounds and equipment is a \$100,000 plant, with 90,000 square feet of floor space, divided into a series of eight or nine buildings, embracing the various departments of aeroplane. ing the various departments of aeroplane manufacture. The factory is equipped with its own thoroughly modern heat, light, and power plant, modern dry kilns, foundry, etc.

It is contemplated that manufacture of plane selling between \$1,500 and \$2,000 will be put in production at the company's factory some time during the early summer. The factory was originally one of the plants of the International Harvester Company, and will constitute, when in operation, one of the largest industries

in its locality.

Deliveries of Merchandise Made by Checkerboard Aeroplane During 1919

Operating two Curtiss JN-4's from its flying field west of Chicago, the Checker-board Aeroplane Service last summer board made 150 deliveries of merchandise to as many towns scattered throughout eight states, covering 17,500 miles by air without a single failure to land the merchandise at its destination.

A better idea of the range of operation of these planes can be gained by learning that the list of towns to which deliveries were made included Louisville, Ky.; St. Louis, Mo.; Toledo, O.; Cedar Rapids, Ia., and Green Bay, Wis.

Although the pilots, David L. Behncke and Bert R. Blair, were flying for the most part over strange territory and landing in unfamiliar feelds which were

landing in unfamiliar fields which were often inadequate in size and crowded with people, the season's record was unmarred by an accident of any kind. Both are men of long experience in the flying game, Behncke in particular, having flown

for over five years without a "crash."

The Checkerboard Aeroplane Service was originally organized by Mr. Behncke to deliver a well-known brand of clothing by air, but has since expanded until it engages in nearly every branch of commercial flying. Several hundred passengers were taken up for sight-seeing rides around Chicago last year, and some flying was done for moving picture concerns.

A department of aerial photography is to be added next spring, and several more planes placed in operation to take care of the increasing demand for commercial flying service.

1920 Directory of Burd Piston Rings

One of the most complete Piston Ring Directories ever published, has just been issued by the Burd High Compression Ring Co. It is a book of 112 pages, 4 x 63/4 inches in size, with an attractive cover design in four colors, and substantially bound in stiff covers.

Over 600 sizes and oversizes of Burd High Compression Piston Rings are listed in the new Directory, a size for practically every make and model of gasoline engine.

In addition to the tabulation of sizes, the Burd Directory contains complete in-structions for the installation of piston rings, information regarding oversizes, and scores of helpful hints and suggestions about motor troubles, elimination of carbon, U. S. Official Millimeters Conversion Table, Decimal Equivalents of Fractions, etc., that are very valuable to repairmen.

A copy of this helpful book will be mailed on request, to any garage or re-pair shop by the Burd High Compression Ring Co., Rockford, Illinois.

The History of Castrol

AERIAL AGE has just received from Lon-on "The History of Castrol; An Avia-on Souvenir," prepared by C. C. Wakedon The History of Castler, An Artistion Souvenir," prepared by C. C. Wakefield & Co., Ltd., and presenting some most interesting facts concerning the part played by "Castrol R" in the aeronautical activities of the British Isles during the last ten years. The book is really a brief history of British aviation and it is of value historically to everyone interested in aeronautics



Factory secured by the American-French Aero Exposition, Inc., in which they will manufacture moderate priced aeroplanes

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mali Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and
Operation



PILOTS

John M, Miller Lawton V. Smith E. Hamilton Lee Lester F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader Charles I. Stanton, Superintendent, Eastern Divisoin George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse Samuel C. Eaton
Robert H. Ellis
James H. Knight
Elmer G. Leonhardt
Paul S. Oakes
Paul W. Smith
Frederick A. Robinson
Max Miller
F. A. Nutter

#### One Stop Aero Mail for New York and Chicago

Cleveland, Ohio.—A one stop aerial mail service between New York and Chicago with 800 horsepower Martin aeroplanes, which will displace the present machines and a railway mail car as well, is to be inaugurated soon, George O. Norville, superintendent of the aerial mail service, announced on January 11.

Service will be started simultaneously from both cities. The pilots will bring their machines as far as Cleveland, which will be the only stop, where they will be relieved.

The capacity of the Martin machines is 1,500 pounds, four times greater than the De Havilands now in use, it is said.

#### Passenger Carrying at Charlotte, N. C.

The A.E.F. Flying Corp., of Newport News, Va., have lately established a flying field at Charlotte, N. C. Here they have been conducting passenger flights and have recently taken up over two hundred passengers. Rex. R. Flury is General Manager, while Lieut. Evans Shealy, ex-Navy pilot, and Lieut. J. W. Frommonger, ex-Army Ace, pilot the two Curtiss "O-X-5" planes at the field, with C. A. Klyce and D. M. Jamieson as mechanicians.

#### A Tailless Aeroplane

The London Daily News of recent date reports a statement made by Mr. J. A. Corry of Burley, Leeds, claiming that in points of stability and safety he has de-

signed a machine which will be the safest and most flexible ever built and which can be run at speeds varying from 10 to 200 miles an hour. According to Mr. Corry, in the present-day machines the flexibility of the engine is mostly used to secure variation of speed, but in his machine no additional and violent stresses can take place even in the case of flattening out after a volplane; and as the machine has no tail, this could not be broken in climbing. He states that it would be absolutely impossible for his machine to corkscrew, overturn, or loop the loop. His design is said to involve a radical change in all known types of construction, but it still remains a true aeroplane, with planes of the kind now in use, and capable of flying with any of the aero engines or propellers already adopted.

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-WASHINGTON ROUTE

Monthly Report of Operation and Maintenance

NOVEMBER, 1919

=					uel,								SERVICE AND UNIT COST					
Aeroplane No.	Gasoline	Grease and Oil	Office Force and Watchmen	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time Rua	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
14 30 31 34 35 36 42 43 46 47 110 111 202 44301 44305		\$2,40 12,92 27,79 17,02 14,92 6,59 13,95 13,28 16,61 13,12 7,46 9,28 1,92 3,00	\$62.07 62.07 62.07 62.07 62.07 62.07 62.07 62.07 62.08 62.08 62.08 62.08 62.08	\$37, 52 37, 52 37, 52 37, 52 37, 52 37, 52 37, 52 37, 52 37, 53 37, 53 37, 53 37, 53 37, 53	\$24.31 24.31 24.31 24.31 24.31 24.31 24.31 24.32 24.32 24.32 24.32 24.32 24.32 24.32	\$58.56 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57 58.57	\$65.33 97.18 319.43 114.73 47.77 65.74 205.92 111.74 83.43 46.95 20.55 31.93 66.69 79.62	\$117.01 97.64 189.05 116.46 89.35 83.77 176.19 203.46 221.11 53.00 72.21 37.96 37.53 72.84	\$41.50 27.50 6.00 4.00 24.80 14.70 302.60 .60	\$46. 24 72. 50 72. 50 72. 50 72. 50 72. 50 72. 50 72. 50 72. 50 72. 50 50. 00 100. 00 78. 50 35. 00	\$52.08 52.08 52.08 52.08 52.08 52.09 52.09 52.09 52.09 52.09 52.09 52.09 52.09 52.09	\$372.51 655.25 404.69 1,112.42 621.56 543.05 532.48 942.34 1,092.37 749.66 510.13 432.66 510.13 432.69	80 280 280 895 201 282 159 784 543 389 150 269 145 28	hr. min 8	650 1,084 7 3,257 8 1,140 533 6 631 2,180 1,710 774 5 575 250 288 490 413	8.1 3.7 5.7 1.9 4.0 2.8 2.4 2.0 3.8 9 2.0 17.5 5.2	\$46.57 55.06 28.43 44.24 92.81 66.14 37.37 79.86 73.40 76.46 202.70 112.79 46.95 47.17	\$0.57 .60 34 .55 1.02 .84 .43 .83 .97 .76 2.04 1.50 .78 1.11
Total	\$1,217.36	·\$160.26	\$931.11	\$562.86	\$364.72	\$878.53	\$1,357.01	\$1,567.58	\$434.20	\$997.24	\$781.29	\$9,252.16	4,285	166 0	13,585	3.2	\$55.70	\$0.68

Cost per mile, overhead, \$.27; cost per mile, flying, \$.20; cost per mile, maintenance; \$.21.

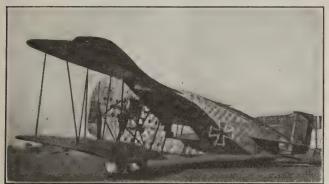
NOTE:—Ship No. 14, Curtiss JN4H, equipped with Hispano-Suiza motor (type "A"); ships Nos. 30 to 47, inclusive, Curtiss R4, equipped with Liberty 12 motors; ship No. 110, De Haviland, equipped with Liberty 12 motor; ship No. 111, Twin De Haviland, equipped with two Liberty 6 motors; ship No. 202, Martin, equipped with two Liberty 12 motors; ships Nos. 44301 and 44305, Curtiss JN4D, equipped with Curtiss OX-5 motors.

OTTO PRAEGER, Second Assistant Postmaster General.

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#### THE LINKE-HOFFMANN GIANT MACHINES

F the firms that have designed and constructed large, multi-engined aeroplanes during the war, special interest attaches to those created by the Linke-Hofmann Works, Breslau, not only on account of their size, but also because their designer has evidently attempted to get away from the stereotyped design in which a multiplicity of engines are simply dumped on the wings and made to drive, direct, tractor or pusher airscrews. That placing the engines on the wings in this manner is a short cut to high-power propulsion is admitted, but it does not by any means follow that this is the type of multi-engined machine that will survive. It is therefore of interest to examine what others have done in their attempts to effect improvements.



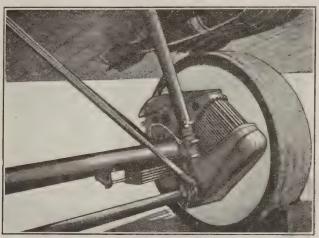
The Linke-Hofmann R I

The Linke-Hofmann Works, of Breslau, took up the design and construction of Giant aeroplanes (Riesenflugzeuge) under the direction of their chief engineer Paul Stumpf, who was formerly chief engineer to the Allgemeine Elektricitäts Gesellschaft (A.E.G.). Two types were built, the R I and the R II, both of which had the engines placed in the fuselage.

#### The Linke-Hofmann, Type R I.

This machine had two tractor airscrews driven by four Mercedes engines of 260 h.p. each, giving a total of 1,040 h.p. The dimensions and weights of the machine were as follows: Span, 109 ft. 6 in., length o.a. 51 ft. 6 in.; chord, upper plane, 16 ft. 6 in.; chord, lower plane, 15 ft. 6 in.; height, 22 ft.; wing area, 2,850 sq. ft.; weight empty, 17,600 lbs.; useful load, 7,000

lbs., including fuel for 5 hours' flight. The machine attained a speed of 80 m.p.h. and with a useful load of 7,000 lbs. climbed to 9,900 ft. in 2 hours. The slow glide in which the machine landed was very peculiar. As the pilot's seat was placed very high, it required a good deal of practice to learn to land the machine successfully. The rudder and elevator control was satisfactory, but the machine was somewhat sluggish on the ailerons. When taxying on the ground she answered the rudder very well.



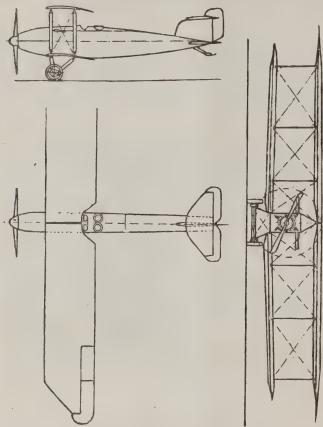
The Linke-Hofmann R II showing view of the undercarriage with shock absorbers

The effort required on the part of the pilot for rudder, elevator, and aileron control was little greater than in the case of a small machine, and the R I was flown often by only one pilot. The very deep fuselage did not appear to have any adverse effect on either the fiying or the steering of the machine. On the contrary, the machine was found to have much of the stability of the old Tauben. This was thoroughly tested during an hour's flight in a wind of 50 ft. per second.

As a result of model tests at the Göttingen laboratory, the fuselage was carried right up to the top plane. The increased lift resistance ratio of the complete machine which the model



The 260 H.P. Mercedes engines of the Linke-Hofmann R I are enclosed in fuselage



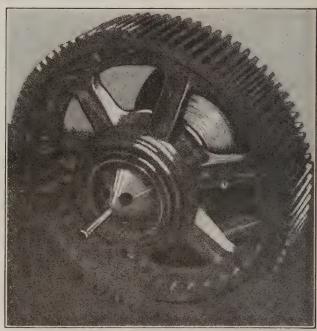
Plan views of the Linke-Hofmann R II

tests appeared to promise as a result of this deep body did not, unfortunately, materialize in the actual machine.

The ventilation of the engine room was very good, and on account of the accessibility of the engines during flight, minor defects could easily be remedied. The undercarraige was of the same simple Vee type as that of smaller machines, and was found to be very light and at the same time strong. During a series of test flights, including a number of heavy landings, any minor defects in it were discovered and put right. The wheels were of iron, and were fitted with solid tires.

The experience obtained with the Linke-Hofmann R I was taken advantage of in the design of the Linke-Hofmann, R II, the chief feature of which was a single tractor airscrew, driven by the four 260 h.p. Mercedes engines. The main figures relating to this machine are as follows:—Span, 138 ft. 6 in.; length, 67 ft.; height, 23 ft. 6 in.; wing area, 3,440 sq. ft.;

weight empty, 17,600 lb.; useful load, 9,000 lb., including fuel for 7 hours' flight. The speed was the same as that of R I, i.e., 80 m.p.h.; with a useful load of 9,000 lbs. the climb was 11,550 ft. in 2 hours. The propeller, which was of 22 ft. 8 in. diameter, was driven by four Mercedes engines through a central drive. Even with only two engines running the machine flew well. For long-distance flying, by doing away with the military loads, and with the following crew, the range can be greatly increased; 2 pilots and luggage 440 lbs., 2 engineers with luggage 440 lbs.; 2 navigators with luggage 440 lbs.; instruments and wireless 660 lbs.; total, 1,980 lbs. The machine is still capable of carrying another 13,400 lbs. of



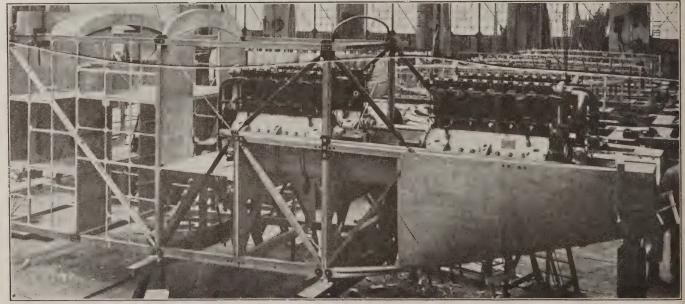
The central spur wheel drive of the Linke-Hofmann R II

fuel and oil, which is sufficient for a flight of 30 hours' duration at a cruising speed of 74 m.p.h., which would give it a range of 2,225 miles.

The passengers are accommodated in an enclosed cabin behind and underneath the pilots' cockpit, this position being one of the safest in the whole machine in case of a crash. All the main weights being in front of the cabin, the safety of the passengers is assured, and in the case of the machine turning over on landing, or striking with a wing tip first, there are no heavy engines or tanks to fall on them. At present accommodation is being provided for 12 passengers.

The risk of fire has been reduced to a minimum by placing

all petrol leads and petrol pumps underneath the floor, where they are well away from any part of the engines which might



Interior view of the Linke-Hofmann works in Breslau

give external sparks. A thorough ventilation of engine room and tank compartment ensures that there are no petrol vapors about, and any petrol leaking out of pipes, etc., flows through

the bottom of the fuselage out into the open.

The undercarriage, which is of the same simple Vee type as that of the Linke-Hofmann R I, has proved to be immensely During a landing in the snow the wheels broke strong. During a landing in the show the wheels broke through the thin frozen crust and sank into the snow as deep as 12 in., the machine rolling over two ditches and coming to a standstill without turning over. Although the snow was shovelled away in front of the machine it was not possible to move it under its own power, and a snow plough had to be employed to get it back to its shed. According to all the experts who witnessed the landing, any other machine would have turned over. It will be seen from the above examples that the general reliability of the machine is excellent. It may further be added that not only can the machine remain in further be added that not only can the machine remain in horizontal flight with only two engines running, but she has actually been known to climb on two motors. The useful load in that case was 5,300 lbs.

The advantages of multi-engined machines with only one propeller may be summarized as follows: The propeller efficiency is very high, owing to the large diameter and slow running. The drive is of the simplest possible type, with only three spur wheels, which makes for greater reliability. The machine can continue its flight with three or even two engines running. On account of the central placing of the propeller the danger of breakage of outrigger or interplane struts-in machines where the screws are so mounted-does not exist,

and the head resistance is considerably smaller. The singlescrew type gives less weight. For instance, a multi-engined with shaft drive to two airscrews on the wings 10 spur wheels and 9 shafts. The single screw type has three spur wheels and four shafts. The engine power is only transmitted through one pair of spur wheels; whereas in the twin-screw type it is transmitted through two pairs. This alone means a gain in efficiency of 3 to 5 per cent., or in other words, a gain of 30 to 50 h.p. The large propeller has stood up to its work splendidly, while, owing to its strong construction, it is practically weather-proof.

further great advantage is the simple two-wheeled Vee undercarriage, which gives small weight and also small air Springing is by means of steel springs instead of k absorbers. The undercarriage is absolutely rerubber shock absorbers. liable, even in heavy landings, with a side wind. The wheels are so large that the machine can even taxy across small

ditches.

The placing of the whole crew in the fuselage makes it possible for them to communicate with each other and to make themselves understood, which has the advantage of offering possibilities for reducing the number of the crew to a minimum. As there is only one central drive with four spur wheels, it is possible to build this so strong, without any undue addition in weight, that absolute reliability is provided.

Even after allowing for a certain amount of patriotic enthusiasm, it would appear that he Linke-Hofmann R II is really a very serious attempt at improving the existing type of

multi-engined aeroplane.



Front view of the Linke-Hofmann R II, equipped with a 260 H.P. Mercedes engine

# NEW YORK AND PHILADELPHIA TO HAVE AERONAUTICAL EXPOSITIONS

Second Annual Aeronautical Exposition of Manufacturers' Aircraft Assn., Inc.

When the Manufacturers' Aircraft Association holds its Second Annual Aeronautical Exposition at the Seventy-first Regiment Armonry, 34th street and Park avenue, New York, in March, 1920, the public will have an opportunity to see what American designers have accomplished in developing commercial aeroplanes-planes for private use, for sporting or touring purposes, or long distance transportation of freight and mail.

Since hostilities ceased, American manufacturers have concentrated their efforts on planes for pleasure, sport and commercial uses. The exhibits will represent all producing aeroplane factories in the United States. Many of the planes are already assembled and in daily flights. Some of the larger ones are carrying mail between principal cities. Others of advanced construction will receive trial flights a few weeks before the exposition opens March 6th.

Many of the models have comfortable, enclosed cabins with unbreakable glass windows. They seat from four to twelve passengers in chairs as luxuriously appointed as those of a Pullman. Noise of the motors is deadened and passengers enjoy a flight much the same as if they were riding in an observation car or limousine without the wheels touching the ground.

Many of the smaller machines are of the limousine type, accommodating two or three persons,

The larger planes have a carrying capacity of from three to six thousand pounds and, driven by three or four motors, will cover half the distance across the United States in a single flight. The cost of operating aeroplanes has been reduced during the last year from the almost prohibitive figure of one and two dollars a mile, until now it compares favorably with motor trucks and railroads.

#### Aero Show to Be Held in Philadelphia

Official announcement is hereby made of the Aeronautics Show of 1920 to be held during the week of March 29 to April 3, 1920, in the Exhibition Hall of the Commercial Museum, 34th below Locust St., Philadelphia, Pa.

The following men, almost all of whom enjoy a national reputation in Aeronautics

and allied lines, comprise the committee:

N. B. Kelly, Chairman, General Secretary, Philadelphia Chamber of Commerce; Jos. A. Steinmetz, Pres. Aero Club merce; Jos. A. Steinmetz, Pres. Aero Club of Pennsylvania and Engineers Club of Philadelphia; Dr. R. B. Owens, Sec'y, Franklin Institute; Claude Collins, Pres. Aviators Club of Philadelphia; Col. Robert T. Glendinning, Robert Glendinning & Co.; Maj. Chas. J. Biddle, Biddle, Paul & Jayne; Coleman Sellers, Jr., Wm. Sellers & Co.; Chas. Hower, Philadelphia Aero Service Corp.; Randolph W. Childs, Esq.; W. R. Kelly, Sec'y,-Treas.; L. D. Odhner, Business Mgr.

The Exhibition Hall of the Commercial Museum is one of the largest, if not the largest, exhibition hall in America, having a total area of over 110,000 square feet. The hall is within convenient access from all of the leading hotels of Philadelphia, and is part of a museum of national reputation which daily attracts great numbers of visitors from all parts of the world. A siding of the Pennsylvania Railroad adjoins the building.

In connection with the exhibition there will be available a large well equipped flying field which will be used by the ex-hibitors for demonstrations of flying.

A group of well trained aviators thoroughly versed in aero mechanics will be held in readiness to act as demonstrators and salesmen for any exhibitors who cannot spare men to accompany their displays.

Among the features of the exhibition will be many machines from foreign countries, as well as America, with famous war records, or with which great aerial feats have been accomplished.

Invitations to attend the exhibition will

be sent to all organizations interested in

promoting aviation.

Executive offices have been opened at 1242 Widener Building, Philadelphia, Pa.

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#### CONDITIONS CHARACTERISTIC OF CARBURETING AIRCRAFT ENGINES

By PERCIVAL S. TICE

#### Resume

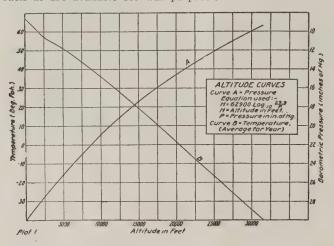
ESTS have been conducted at the altitude laboratory Advisory Committee for Aeronautics to determine the changes in engine performance with changes in atmospheric temperature and pressure at various levels above the earth; surface, with special reference to (a) the variables affecting the functioning of the carburetor and (b) the changes in performance resulting from variables in the carburetor itself. This work has resulted in the following conclusions:

air (1) Mixture ratio (air fuel) should be constant at all pres sure levels, for maximum power at all levels.

(2) Change in viscosity of fuel with temperature change may be an important metering characteristic of the carburetor.

(3) Unwarranted waste of fuel is invariably involved in the use of carburetors not fully corrected for barometric changes

(4) Heating of the mixture causes a loss in power output accompanied by an increase in the specific consumption of fuel (lb. gasoline/brake horsepower/hour), at least with such fuels as are available for war purposes.



#### Carbureting Conditions Characteristic of Aircraft Engines

The following results are offered as characteristic of the conditions surrounding the carbureting system of an aircraft The whole is indicative of the changes experienced following those variations in barometric pressure encountered in the service operation of such engines.

Briefly, the purpose of this report is merely to summarize certain of the performance characteristic of an aircraft engine, to be followed later by a detailed investigation and report on the carburetion requirements and means for satisfying them in this service.

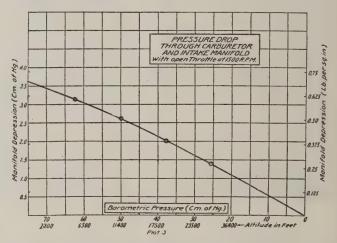
All of the tests from which the following material is taken were made in the altitude laboratory at the Bureau of Standards, employing a 150-horsepower Hispano-Suiza, type A engine, having eight cylinders in blocks of four, set at 90°:

Bore 120 mm. (4.73 inches).

Stroke=130 mm. (5.124 inches).

Compression ratio 
$$\left(\frac{\text{Total volume}}{\text{Clearance volume}}\right) = 5.3.$$

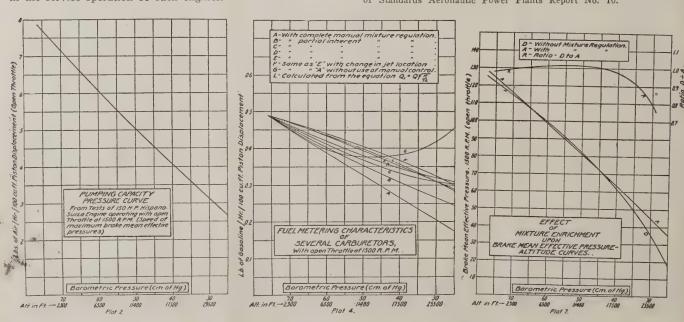
A constant speed of 1,500 revolutions per minute (the speed maximum mean effective pressure) was maintained throughout the runs.

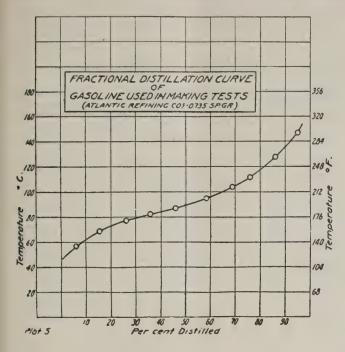


It is known that the values of the air readings used in the following plottings are somewhat high; and, for this reason, it is pointed out that the results including air/fuel ratios for the mixtures should be employed qualitatively rather than quantitatively, though the results are in perfect agreement among themselves.

The graphs used are described as follows: Plot 1.—Curve a, altitude, in feet above sea level, versus barometric pressure; and curve b, temperature (mean annual) versus altitude in feet above sea level

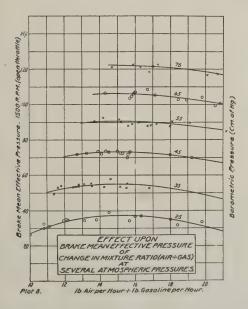
<sup>&</sup>lt;sup>1</sup> This Report was confidentially circulated during the war as Bureau of Standards Aeronautic Power Plants Report No. 10.



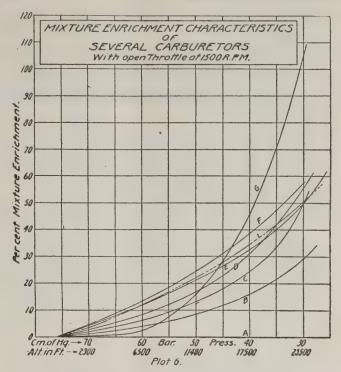


Plot 2.—Engine pumping capacity in pounds of air per hour per 100 cubic feet of piston displacement, with open throttle, versus barometric pressure. The points on this curve are means of a great many measurements using a carburetor capable of giving maximum output over the whole range of pressures; and while the readings are known to be high, as noted in the introduction, the characteristic is quite definitely established. It will be noted that the curve quite pronouncedly turns upward as the pressure becomes less. This follows from the fact that the pressure drop to cause air to flow at constant velocity is less with lesser density, thereby permitting the aspiration of proportionately greater volumes of air as the density value lowers. The graph, plot 3, showing manifold pressure drop plotted against barometric pressure, in this case carburetor inlet pressure, is characteristic of the variation in pressure drop to cause air to flow in the intake system with changes in atmospheric density.

Plot 4.—Pounds of gasoline (0.7350 sp. gr.) per hour per



100 cubic feet piston displacement, with open throttle, versus barometric pressure. The fuel used in these tests is described by the fractionation curve of plot 5. In plot 4 is shown the manner in which conventional carburetors, designed for compensation in the ordinary sense at ground level, cause enrichment of the mixture with lowered atmospheric pressure. Curve a is from tests of a device having a manual control reset to give greatest power output at each barometric level. Curves b, c, d, and e are results with several carburetors, some of which embody a measure of correction for enrich-



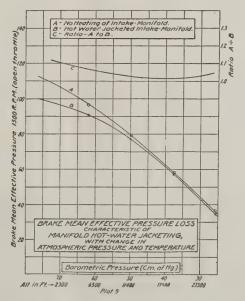
ment with lowered density. Curve L is calculated from the equation:

$$Q_1 = Q \sqrt{\frac{P_1}{76}}$$

in which Q=the quantity of fuel discharged at sea level,  $Q_1$ =the quantity of fuel discharged at any other level, corresponding to the pressure  $P_1$ . This equation assumes a constant value for the coefficient in the equation:

$$V = C \sqrt{2 \text{ gh.}}$$

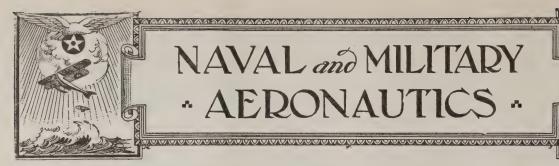
for the fuel metering passage. Curve g, plot 4, is that for carburetor (a), but with ground setting of the manual control at all barometric levels. The great waste of fuel resulting from the use of a carburetor uncompensated for wide barometric changes is obvious from the diagram, particularly when it is considered together with that of plot 7, wherein



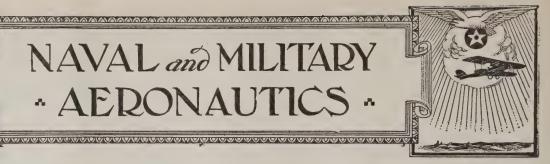
are given the brake mean effective pressures corresponding with the two rates of fuel consumption presented in curves a and d of plot 4.

The observed enrichments, expressed as per cent excess fuel in the mixture, for the several cases of plot 4, are plotted in plot 6, against barometric pressure.

The considerable variations among the curves of plots 4 and 6 are largely the result of variations in the extent to which change in viscosity of the fuel with temperature enters the results. No two of the several carburetors used in these (Continued on page 544)



# AVAL and MILITA **AERONAUTICS**



New York Led States in Air Officers

Washington — New York furnished more officers for the Air Service of the army during the World War than any other State, according to revised figures made public by the War Department. total number furnished by the whole country was 20,600 officers, of which 12,-382 were flying officers, trained for flying duty as pilots, observers, aeronauts, and aerial gunners. New York furnished 3,024 officers for the Air Service, of whom 1,512 were flying and 1,512 nonflying officers. In the order of their rank the only other States furnishing each 1,000 or more officers for the Air Service were Illinois, 1,604; California, 1,505; Massachusetts, 1,400, and Pennsylvania,

U. S. Flyers Off for Hawaii

The fourth section of the Aero Squadron, with eleven officers and 130 under the command of First Lieut. Harry H. Young, left Mitchel Field, Hempstead, on January 10, for Ford Island, near Honolulu. They will spend two years there doing coast patrol duty, observation work and making maps.

With the detachment went a quantity motor transportation material. At Honolulu the men will receive the newest types of De Haviland planes and hydro-

This section is said to be the pick of the field, as most of the men served overseas, while a majority of them were members of the 1st Air Squadron, which reached Europe in advance of the American air forces.

Naval Airmen on Cruise "Spot" 12 California Whales

San Diego-Naval airmen, patrolling to fish for local fishermen, reported that five miles at sea off La Jolla, at the northern end of the city, they saw a school of about 12 California gray-back whales chasing sardines. The whales, said the airmen, spouted water in showers and followed the sardines until fishing boats appeared. They could see the

whales submerge to a depth of possibly thirty feet and then come to the surface

These are the first gray-back whales reported here in a school in nearly twenty

Air Service and F. A. Co-operation Major Gen. Charles T. Menoher, Director of Army Air Service, has requested that the commanding officer and those Air Service officers stationed at Post Field, Fort Sill, Okla., in accommodating the Motorized Field Artillery which is to be transferred to that station, co-operate to the greatest possible extent, and that arrangements and all subsequent dealings be such that there will not be alone co-operation but actual accommodation. The Air Service has been assured a mutual degree of co-operation and co-ordination, and this atitude upon the part of the Air Service should not be confined to the commanding officer and his staff, General Menoher points out, but should prevail throughout the command in order that not alone the officer but the enlisted personnel of both branches of the service may be drawn into a closer and more fraternal association which will be helpful to both.

Unique Feat of Aerial Photographer

Two officers of the Photographic Section of the Army Air Service performed a unique feat in aerial photography in the Panama Canal Zone on Dec. 4. When the U. S. S. Northern Pacific, bearing the Secretary of War and Chief of Staff and party, was approaching the entrance to the party, was approaching the entrance to the Panama Canal, the ship was met by a squadron of DeHawiland planes from France Field and escorted to Gatun Locks. One plane, piloted by Lieut. Charles B. Austin, with Lieut. Dayton A. Watson, photographer, as passenger, took victures of the transport and flow immediates. pictures of the transport and flew immediately to France Field. There the plates were developed, prints made, and the two officers flew over the ship and dropped the prints on deck as a gift to the Secretary. The total time from snapping the camera

to delivering the prints was fifty-three minutes.

Coast Patrol Report

On December 17, 1919, in spite of the cloudy and foggy weather, First Lieutenant C. E. Duncan, A. S. A., and his observe, First Lieutenant L. M. Wightman, covered the 365 miles coast patrol from Mitchel Field, L. I., to Langley Field, Va., in two hours and ten minutes. At Sandy

in two hours and ten minutes. At Sandy Hook, Atlantic City, Cape May and Cape Charles boats were sighted.

The DH-4 plane No. 63110 was flown at an altitude of 2,000 feet, making an average speed of 120 miles per hour. In all 63 gallons of gasoline and 16 quarts of oil were used for the whole trip.

New R. M. A.'s

The following named officers having completed the required number of tests, completed the required number of tests, are rated as Reserve Military Aviators: First Lieut. Daniel L. Dwyer, A. S. A.; Capt. Miller Robert Taylor, A. S. A.; Capt. Gordon F. Willey, M. C.; Capt. Fred G. Rand, Chaplain; First Liept. John A. MacDonald, A. S. A.; Second Lieut. Rosenham Beam, Field Artillery (attached): Second Lieut. Norman L. Lieut. Rosenham Beam, Field Artillery (attached); Second Lieut. Norman L. Roddy, A. S. A., and Second Lieut. David G. Lingle, A. S. A.

Thomas F. Egan, formerly Second Lieutenant, Air Service Aeronautics, is rated as a Reserve Military Aviator to date from August 19, 1919.

Major William H. Saunders, Junior Military Aviator, Air Service Aeronautics, is rated as an Aerial Observer to date from October 20, 1917.

Names New Dorp Aviation Field

Washington.—Secretary Baker has directed that the Air Service Coast Defense Field at New Dorp, Staten Island, be named Miller Field, in memory of Captain James E. Miller, who was killed in action March 8, 1918, about four kilometers north of Corbény, France, while serving with the 95th Aero Squadron on the Soissons sector.



A Handley-Page aeroplane fitted with two Napier engines, which was exhibited at the Paris Aeronautic Exposition. which is entirely free from struts or bracing wires and is furnished with carpets, electric lights, clocks, telephones recently flew to the Exposition from England to Paris, in two hours and ten minutes. The machine has a salon and all conveniences. It

#### Engine Rules for Pilots

The following engine rules are furnished Air Service pilots and are published in the News Letter for the interest of all concerned outside of the service:

In order that an engine may give a maximum length of service two things are essential—first, that it never be suddenly accelerated or decelerated, and second, that it never be allowed to race in the air.

In reference to the first point, sudden acceleration or deceleration of the engine causes sudden changes in temperature which result in warping of parts. Especially is thus true of valves, and the majority of valve trouble is started this way. A very slight warpage of the valve will cause the valve to burn and a missing cylinder results. The extent of this trouble varies with different engines and is very common with the Hispano-Suiza. Sudden changes in temperature also set up strains in other parts which weaken them and may result in a permanent injury.

With this in mind all pilots, on starting an engine, should warm it up gradually. It should be idle just fast enough to keep all cylinders firing until the temperature is at least 60 deg. cent. In cold weather it may be necessary to run a little faster, but it must be remembered that when the engine is cold the oil is thick and there is danger of cavitation in the oil line if the engine is speeded up. When the engine is thoroughly warmed up it may be gradually opened wide for a short time to insure that it is working properly, but continued running with open throttle on the ground will cause overheating.

In taxiing the throttle should never be suddenly opened or closed unless it is absolutely essential. In taking off, the same is true. It is not necessary to suddenly push the throttle open. Take it easy—the results are far more satisfactory.

In the air, unless you are actually engaged in stunting, the engine should be partly throttled. The aeroplane will handle better, the life of the engine will be lengthened, and the cruising radius will be increased. The Hispano-Suiza and the Liberty are high compression engines and designed for full throttle only at high altitudes. Never let the engine race—keep the nose up or throttle the engine. In starting, throttle whenever the engine races—don't go into a glide or slip with the engine full on.

When you close the throttle, close it slowly. If the throttle is jerked closed

the valves which are running at a cherry red heat will cool suddenly and a warpage will result.

Another source of trouble is that of fouling of plugs, and it is almost entirely the fault of the pilot. However well the engine may be adjusted, abuse in the air can result in fouled plugs. In a glide the engine must be kept warm. It should not be allowed to go below 70 deg. cent., and the throttle should be repeatedly opened to clear out the cylinders. When the engine is allowed to cool too low a temperature, contraction of the pistons allows too much oil to be "pumped" into the combustion chambers and the plugs will be fouled. The temperature may be kept up by the use of shutters if they are available, and by the proper adjustment of idling speed.

Another point to be remembered in allowing the engine to cool too much is that the carbureters are adjusted to use the least possible amount of fuel when the engine is well warmed up. With this adjustment a cold engine will not respond rapidly to the throttle, and will not be available in close quarters when power may suddenly be required.

A common mistake made in starting an engine is that of flooding. In cold weather it may be necessary to prime the engine, but this should not be overdone as it is easier to overcome too lean a mixture than one too rich. The Liberty may be primed by the use of the Lunkenheimer primer on the dash and the Hispano-Suiza through priming cocks on the manifold. The charge should be taken into the engine with the throttle nearly closed, and no time should be lost between the taking in of the charge and its ignition, as only a short time in a cold engine is sufficient to cause the "fog" of the gasoline in the intake pipes and cylinders to condense. The propeller should be "placed" quickly and the pilot should be ready to turn the starting magneto as soon as "clear" has been called. If the engine is flooded it may best be cleared by turning the propeller backward.

In conclusion, it is desired to emphasize the fact that the engine's performance and length of life depend largely on the pilot. If the engine is running all right when you take it, and an aeroplane should never be taken with the engine missing or failing to turn up to its proper r.p.m., it will continue to do so except in exceptional cases, if you handle it properly. Many of the pilots used Curtiss OX-5 engines in their training, and make the mistake of thinking that other engines should give the same performance. They do not

stop to think that the Curtiss OX-5 was designed to stand abuse, while in the design of such engines as the Hispano-Suiza and the Liberty performance was given the greatest weight. Failure to obtain good performance from the latter engines is a perfect indication that the pilot does not understand them.

#### Hensley Urges Development of Rigid Airships

Colonel William C. Hensley of the Balloon and Airship Division of the Air Service has been in Europe for the last six months studying the construction and operation of the modern types of dirigibles, particularly the rigid dirigible. He has covered the ground thoroughly in England where he has taken a complete course of training in handling such ships. He is now in Germany and is at present mastering the intricate details relative to the construction and operation of the German rigid airships. In the ensuing description which is copied from his report, he gives a vivid account of his experience in a German rigid "Bodensee," a rigid airship of most improved design and construction, and urges the development of this branch of aerial navigation in the United States.

"Airships are now possible in any kind or condition of weather." No weather conditions, except a strong-cross hangar wind, prevent the "Bodensee," the commercial air liner built since the armistice by the Zeppelin Airship Corporation at Frederichshafen on Lake Constance, from making its daily flight between Frederichshafen and Staaken, which lies some thirteen miles from Berlin. Of this fact, my last flight convinced me.

In a \*driving snowstorm, October 25, 1919, at 9:30 a. m., we left Frederichshafen in this "Bodensee." At 100 meters height, we lost sight of the ground, and had to steer by a dead reckoning and to locate by directional wireless from Frederichshafen and Staaken. Once only did we see the ground. That was when we turned a circle over the town of Gera to determine direction of wind. About 150 kilometers from Staaken we entered a fog, about 100 kilometers from Staaken, a driving rain.

Each day the trip is made one way

—Lake Constance to Berlin, or viceversa. Two days in each week, one up
and one down journey, the route goes
via Munich where a landing is made to
discharge and to take on passengers. It

(Continued on page 545)



The Fiat A. R. F. biplane, with 700 H.P. Fiat engine, which has a speed of 155 miles per hour and carries enough fuel for 8 hours



#### **FOREIGN NEWS**



#### British Set July for 1920 Aero Exhibit

British Set July for 1920 Aero Exhibit

London.—Arrangements have now been made to hold an International Aero Exhibition at Olympia in July next. Before the war a successful series of aero exhibitions was held by the Society of Motor Manufacturers and Traders at Olympia.

Owing to the growth of the British aircraft industry during the war, the aircraft firms have formed a separate body, the Society of British Aircraft Constructors, which comprises in its membership practically every manufacturer of aircraft, aircraft engines and their component parts, equipment and materials; this body has entered into an agreement with the Society of Motor Manufacturers and Traders under which the pre-war aero exhibitions will be continued under the joint management of the two societies.

The arrangements provide for the setting up of a joint committee to promote aero exhibitions in the United Kingdom and the use of the exhibition organization maintained by the Society of Motor Manufacturers for the carrying out of its annual motor and other exhibitions.

#### To Take Up Hydro-Aviation

Buenos Aires.—Immediate development of hydro-aviation will be undertaken in the Argentine navy as a result of the gift of four of the latest types of hydro-aeroplanes from the Italian gvernment.

The machines were used by members of the Italian aviation mission sent to this country several months ago to give exhibition flights at the Argentine aviation school.

#### \$270,000,000 On Air Force

London.—Expenditures of the Air Force for the year ending March, 20, are placed at £54,000,000, in estimates made public.
The personnel of the Air Force is given as 35,000 men.

#### High Speed by the "Bodensee"

Having been repaired after its recent mishap, the German passenger airship "Bodensee" on November 23 made its fastest voyage, attaining an average speed of over 100 miles an hour, making the trip from Berlin to Friedrichshafen in three and three-quarter hours.

#### Civilians on 9,000 Mile Flight

Paris.—Aviators Douilh and Des Noyelles, civilians, have started on an aeroplane flight to Saigon, capital of French Indo-China. The route they will follow will include Naples, Athens, Basra and Bangkok, the distance being about 9,000 miles.

#### Air Travel De Luxe

The airship "R 33" has been making a tour of the French battle-fields, says the London Sphere, and it carried a chef and gave its passengers French cooking, and real beds, with sheets. "During a flight from Amsterdam to England, this lunch was served on a passenger aeroplane: Salmon mayonnaise, cold chicken, fruit salad and wine.

#### British Aero Mail Pronounced Success

Washington.—An aero mail service between Bristol, Birmingham, Newcastle, Manchester and Glasgow, in England, has operated successfully thus far, according to a report from the American Consul General. Letters for these cities are received at the central offices in London up to 9 p. n. and return services are due to arrive in London from the cities at 12 o'clock noon every day.

#### Swiss Air Postal Service

Swiss Air Postal Service

Washington.—An aerial passenger and postal service has been established between Geneva, Lausanne, Berne and Zurich, Switzerland, according to a commerce report, commencing September 1, 1919, the following schedules were observed:

Leaving Zurich at 10 a. m.; Berne, 11.05 a. m.; Lausanne, 12.05 p. m., and arriving at Geneva 12.40 p. m.

Leaving Geneva at 2 p. m.; Lausanne, 2.40 p. m.; Berne, 3.35 p. m., and arriving at Zurich 4.30 p. m.

The cost of a ticket from Geneva to Zurich and return is 500 francs (\$96.50), and for a ticket to Berne and return 300 francs (\$7.90).

A postal service also is maintained. In addition to the regular postal charge, a special 50-centimes (10-cent) stamp must be affixed to each letter. Small packages, weighing up to 12 lbs., are carried at the rate of 50 centimes (10 cents) for each half pound.

#### French Records

The Royal Aero Club has received from the Aero Club de France the following French records established during 1919:

Altitude (Aviator alone). Altitude (Aviator alone).

Place

Issy-les-Moulineaux
Aviator and 1
Aviator and 4
August 13, 1919
Aviator and 4
Aviator and 13
Aviator and 24
Aviator and 24
Aviator and 24
Aviator and 24
Aviator and 25
Aviator and 26
Aviator and 27
Aviator and 27
Aviator and 28
Aviator and 29
Aviator and 29
Aviator and 29
Aviator and 29
Aviator and 20
Aviator and 30
Aviator and 4
Aviator and 4
Aviator and 5
Aviator and 5
Aviator and 5
Aviator and 5
Aviator and 6
Aviator and 7
Aviator and 10
Aviator Jean Casale Height 31,235 ft. Jacques Weiss 29,530 ft. 20,640 ft. Bossoutrot 19,655 ft. Bossoutrot 15.945 ft. Bossoutrot

#### An Ambitious Scheme

An Ambitious Scheme

A company has been formed in England for the purpose of operating a fleet of airships to various parts of the world. The syndicate desires to acquire ground near Southport, where it proposes to erect a tower 120 to 150 feet high to which airships may be moored, and an elevator will take the passengers up the tower and into the gondolas of the ships. The syndicate intends to have a fleet of non-rigid airships in commission next spring; the smaller will carry 32 passengers and crew and the larger 40 passengers and crew. The company also anticipates running some of the larger rigid airships now in course of construction. These will have a carrying capacity of 150 passengers and be able to travel to any part of the globe. It is proposed to use the smaller non-rigid airships to feed the larger ones and meet them at the principal centers. The cost per mile is put at about half the cost of a taxicab fare today, approximately about 18 cents per mile.

By Air to The Hague

A daily air service between Hounslow and an aerodrome near The
Hague is being organized by the Aircraft Manufacturing Co., for the
Airco machines, which have carried out the London-Paris passenger
express since August 25th, and opened the air mail to Paris on November
10th.

Hague is being organized by the Aircraft Manufacturing Co., for the Airco machines, which have carried out the London-Paris passenger express since August 25th, and opened the air mail to Paris on November 10th.

The new service will connect with express trains leaving The Hague for Rotterdam, Amsterdam, and other cities; and by next spring a business man will be able to breakfast in Amsterdam, lunch in Paris, and dine in London—all on the same day.

The practical experience gained on the London-Paris route will lead to the construction of a new aeroplane, the Airco 18, designed for daily use in these high-speed European airways. This machine will carry cight passengers in a luxuriously appointed cabin; while it will be possible, quite easily and rapidly, to remove the seats from the cabin and find accommodation for about a ton of mails. The motor used will be a 450 hp. Napier Lion, and when fully loaded the machine will be a 450 hp. Napier Lion, and when fully loaded the machine will fly at a speed of 114 miles an hour.

The three types of machines hitherto employed, the Airco 4a, Airco 9, and Airco 16, all fly at a speed appreciably more than 100 miles an hour. This speed enables the 250 miles journey between Hounslow and Le Bourget to be accomplished often in appreciably less than the scheduled 2½ hours; and, since November 10th, when the British and French Post Offices began to use the Airco machines for the carriage of an express air mail at a surcharge of half a crown an ounce, it has been found possible, thanks to the speed of the machines in flight, and by expediting land connections, to get a letter right through from London to Paris in five hours—this including express land collection, aerial transport, and express land delivery.

The actual flying record of the Airco machines from the institution of the service on August 25th is as follows:

Flights accomplished.

193

Flights accomplished.

194

Flights accomplished.

195

Each Airco aerial postman, flying between London and Paris, now carries with

France to Have Fifteen Aeroplane Regiments

London.—The important role played by aviators during the war is to be commemorated in the French Army in times of peace. Whereas, no official air regiments existed in 1914, the reorganized army will have fifteen regiments using rapid planes and three bombarding regiments. Algeria and Morocco each will have one regiment of flyers. Pilots will be specially trained for service in these regiments, while volunteers with proved abilities to fly will be accepted.

The Latest Flyer

A very old idea has appeared in a new form; that is to say, the principle of the helicopter is to be applied to a modern aeroplane. The French Government is giving financial aid to the inventor, a M. Louis Damblane, and it is hoped that it will soon be possible to carry out practical tests. The machine will receive its motive power from two propellers which, unlike the propellers now used on aeroplanes, will not be fitted at one fixed plane; thus they can be tilted from a vertical to a horizontal position. The machine will rise vertically, and should be able to remain motionless in the air. The desired height having been reached, the propellers can be shifted to the ordinary angle for travelling. The machine will have this advantage over previous helicopter inventions, that in case the motor fails it will be possible to plane down and land safely, its supporting surface being, in fact, some 44 square metres.

Air Squadron Joins Nile Column
Cairo.—An air squadron is joining a punitive expedition against
Dinka tribesmen who attacked a British column in the Upper Nile
region early in December.

Turk Exiles Flee by Air

Stockholm.—Colonel Dalbeck, a Swedish officer at the head of the Lithuanian air force, who has just returned from Kovno, has related a thrilling story of the narrow escape of Enver Pasha and Talaat Bey, former Turkish ministers, now in exile, from being captured by British officers and Lithuanian troops a few weeks ago.

One day, said Colonel Dalbeck, an unusually large aeroplane appeared over Dunaberg, but was obliged to descend in the neighborhood, owing to motor trouble.

Besides the pilot and the engineer the aeroplane contained two passengers. All were arrested. The next day, after the engine had been repaired, a German flight officer, named Rother, then in the Lithuanian service, asked permission to fly the machine with a beginner. This he was allowed to do, but the aeroplane descended some miles outside the town. Here the student was sent away and suddenly two men, apparently strolling with an armed guard, appeared. Rother managed to smuggle loaded revolvers into the hands of two men and the guards were bound and the aeroplane with the two passengers flew away, landing some hours later at Tilsit, in East Prussia. The two men were Talaat and Enver, as Rother admitted in a telegram he sent asking to have his baggage forwarded to Germany.



# ELEMENTARY AERONAUTICS

#### and MODEL NOTES

By John F. McMahon

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#### Motorcycle Engined Biplane

The accompanying drawing shows how a biplane can be built on the same plan as the monoplane, with the exception of the wings which are a trifle different inasmuch as the upper wing is of shorter spread. It is 20 feet instead of 24 as in the monoplane. The bottom wing has a smaller chord, for it is only 3½ feet. Dimensions for the 3½-foot chord are as follows, using the U. S. A. No. 1 curve.

Before going on, it would be well to inform readers frankly that they should not expect too much of a motorcycle-engined.

that they should not expect too much of a motorcycle-engined aeroplane. The horsepower required to fly the monoplane figures out at between 9 and 10 at 50 miles per hour. For the biplane it figures out at around 13. This means actual horsepower. It must be borne in mind that owing to the slippage of the propeller the horsepower must be greater than that required in order to develop the required amount to overgone the total registrates. come the total resistance.

For instance, if we need 13 actual horsepower to overcome the resistance and fly the machine at 50 m.p.h. we must develop 17 1/3 h.p. The reason for this is the slippage which is approximately 75 per cent. Then 75 per cent of 17 1/3 h.p. equals 13 or the maximum horsepower needed. Now a stock motorcycle engine develops around 18 horsepower at full throttle, so one can feel safe in believing the machine will fly. Of course, less horsepower is required at lower speeds until the angle of incidence of the wings must be at too great an angle which would increase the horsepower again. The monoplane would need less horsepower at the higher speed, but unlike the biplane it would not have a low landing speed.

The performance of the machine is limited to the motor, and, if as outlined, the motor will be powerful enough to attempt only short straight flights. No motorcycle can make any sensational flights unless the power is increased, as, for example, using the four valve in head much the same as racing machines. If something like this is used, turns, etc., can be accomplished because there will be a small reserve and this tends to increase the efficiency.

The body is similar to that in the monoplane descriptionlikewise the tail and rudder assembly. The wings are braced with tubing for cross struts and tubing with the wood fairing

The upper wing is made in two panels joined at the center to two V-shaped steel pylons inverted and bolted to the body. The lower wings are joined and fastened to the body, set at a slight dihedral angle as shown. The two wings are joined and braced with interplane struts that have no cross bracing but are free to move up or down. The leading set, however, remains in the same position at all times; the rear set is the

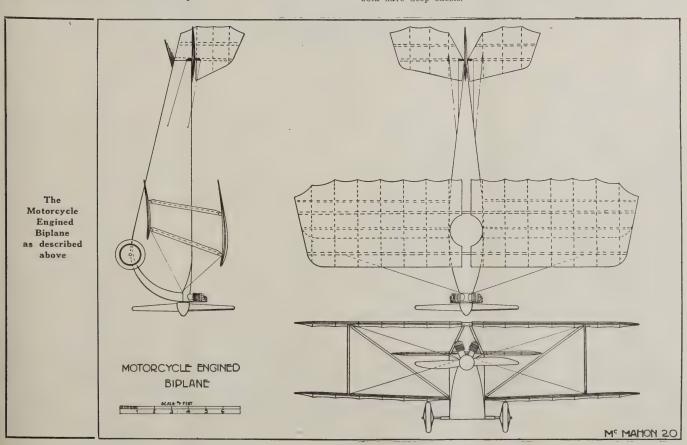
but are free to move up or down. The leading set, however, remains in the same position at all times; the rear set is the only free one and is moved by the bracing strut that is connected with the stick control assembly.

When the stick control is shifted to correct lateral stability both wings or warps, this gives positive action and at low speed is more effective.

There is a hole in the upper wings over the body. This is the space through which the operator climbs and makes the pilot's seat more accessible. It is not an easy matter to climb into any single seater or two place machines so it will not be any more difficult to climb into this one. Of course, to facilitate matters, the seat could be placed to the rear of the wings if the motor was heavier, but because of its light weight we must make the pilot sit close to the nose in order to prevent tail heaviness. This particular machine will be a trifle nose heavy, which is desirable in a light machine, as it will always assume a correct gliding angle should the motor fail for any reason.

The hole in the upper wing is made by fastening a piece of ½ × ¾" strip of wood bent to a radius forming a half circle. The opening extends from the outside rib to the rib next to it. When the wings are joined a space 6" wide is allowed between the wings. A bracing cable runs from the nose of the fusilage to the leading strut and is connected to the fitting at the bottom where it joins the lower wing spar. Another one runs from the nose to the upper fitting.

When making the lower wing be sure to locate the spars correctly as shown by the dotted lines in the plan drawing. At first glance the side view of the machine may look to the reader as though the body were too deepchested, but such is not the case as the most efficient aeroplane of the old type—the Nieuport Monoplane—was powered with a 2-cylinder air cooled tractor motor of 16-18 horsepower. This machine had an extremely deep chest, but with the low horsepower mentioned, startled the aviation world with a speed of 68





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Remou Speaks

I do not know whether it is "journalese sob sister" stuff or where it originates, but I think I speak for every bona find flyer when I say I do not like being called a "birdman." Perhaps the kind who flop their wings and crow do, but I don't. It makes me feel that I should have don't. It makes me feel that I should lunch on canary-seed and go to sleep on a hen-roost.

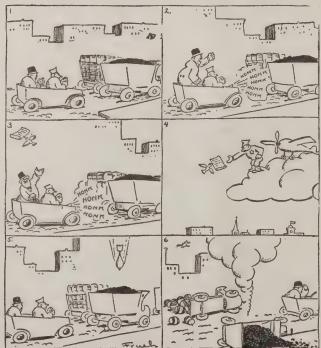
Having flown an aeroplane for several years while the aforesaid "sob sister" human interest gentlemen were learning the three R's, I object to being told it was an airplane and that it lived at the airdrome. I had an Airdale terrier, and I determined in equity to call him an Aerodale, but he walked into a prop, and his tail was cut short.

A loose terminology—loose in any sense—inevitably leads to confusion of one kind or another. I cannot imagine anything more heart-rending than a poor innocent airman being enticed by journalese inaccuracy into an aeroplane, believing it to be a ship, and then finding it unable to hover.

Having once expressed my ideas, I have been requested to give a few tips on the subject, which I will attempt to render without technical frills:

Airman—Not a flying man. He is an enlisted mechanic who feeds and grooms the machines. Airship—A lighter-than-air apparatus, with a few engines hitched on here and He is an enlisted mechanic on here and there. They generally appear in the midnight sky about seaserpent season. May be recognized by cigar-shape, which has added greatly to its popularity as an advertising medium. Aeroplane—A heavier-than-air mechanism that remains aloft by virtue of being moved through the air by an air-screw which cuts out successive chunks of air, the aeroplane immediately rushing in to fill the vacuum. Airplane—A "journalese" invention that combines the properties of an aeroplane, tank,

#### MAYOR HYLAN'S SKY COPS



Courtesy-N. Y. World

airship, wheelbarrow, lightning-rod and submarine. hovers immediately above each observer's head, and has been hovers immediately above each observer's head, and has been known to have bitten its own tail. Its speed varies from 300 m.p.h. to "getting off" on Leicester Square. Monoplane—(Nothing to do with Monopole). Airnaut—A U. S. invention; very secret. Steering-wheel—This is only fitted to the airplane. Aeroplanes use a rudder-bar connected to a rudder by various gadgets. Hydroplane—A word used when something else is meant. Hydro-aeroplane—An aeroplane equipped with floats instead of wheels, so that it can sit down and rest on the water. Pancake landing—So-called from the close resemblance to the normal glide of an inherently stable panon the water. Pancake landing—So-called from the close resemblance to the normal glide of an inherently stable pancake. Fall—All "airplane" "crashes" are falls, even if they only taxi into a fence. No aeroplane has been known to crash except by giving a sickening roll and going out of control. It then falls thousands of feet—and bursts a tire. Air pockets—Places where less than normal density prevails, caused by air having been removed. Ascending currents of hot air from groups of "journalese" also cause disturbances in the air.

"Oh! mamma, I'm frightened," came from little Tommy in

"What are you frightened about, my son?" asked his mother.

"I hear somebody on the roof."

"Go to sleep, my boy, that is only your father taking off his boots before he sneaks in through the skylight. He has just come home from the club in his airship."

Everything in the village seemed the same to old Giles, who had just come home after spending several years in a prison camp in Germany. He looked around—the old church, the old house—yes, everything was the same except— "Where is Modges' other windmill?" he asked in surprise. "There used to be two and now there is only one."

The native 'addressed looked around as if to justify the statement. Then he said slowly, "They pulled one down. They weren't enough wind for two."—Tit-Bits.

"Why do they call you aeronauts?" asked the sweet young

"Because, when aeroplanes were first invented, they didn't know whether they would stay in the airornot. But the name

He was an unassuming chap Before the great big row. He now looks down on common folks, He's an aviator now.

It was his first day in a sausage, and he was not any too sure of his chances with the parachute if it came to a jump. "Wonder where where a fellow would land if he elected to stay in the car?" he mussed.

Any idea, Billé" And Bill, with a sigh at the thought of a hundred and one similar questions already answered, spoke thusly: "Ain't yer never bin to Sunday School, then?"

Yes, Percy, to learn to be a pilot under the regulations shortly to be issued, you must learn aerostatics, meteorology, orientation, azimuth, starglobes, astronomy, astrology, chronometry, hour-angularity, hotairology, drift, dead reckoning, boxing the compass, swinging the lead, adjusting the truth and deviating from it without precipitation and some other things. Without these things you cannot hope to be a pilot. If, however, you have ever waggled the joystick of a Curtiss for five minutes or so, you might be appointed Deputy Director-General in charge of Jazzology or something.

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

# EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

Can you Imagine These Birds in a Race for Speed?



Or These Planes in a Speed Test?



Ordinary type airplane with Retractable Chassis



The following is an extract from a report by Mr. L. V. Kerber on one of the latest U. S. Army airplane designs:

Effects of retracting the Chassis Total Resistance of Extended Chassis
Difference
decreased 48.6 # 278.6
At 100 miles per hour the total resistance with chassis extended is 210 plus 278.6
creased 486.6
By retracting the chassis the maximum horizontal velocity is increased — - 1
velocity is increased ————————————————————————————————————

the following patented features will be recognized as indis-pensable to any type of retractable chassis: I—The chassis should be equally strong in spite of its re-tractable feature.

The chassis should be equally strong in spite of its retractable feature.

It should not weigh more including retracting mechanism than the ordinary chassis.

It should neither occupy useful space when retracted nor require an enlarged fuselage to house it.

It should be adapted in strength as an alighting device in any intermediate position between fully extended and fully retracted, both in case the pilot should make a hurried descent and in order to make available a ready means of varying the position of the chassis relative to the centre of gravity of the aeroplane.

It should automatically close the housing recesses so that the fuselage or wing skin forms a flush surface when chassis is retracted.

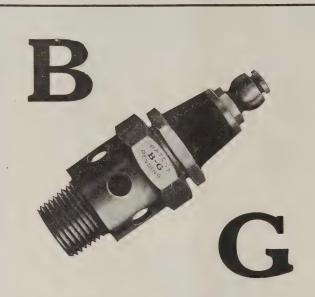
The gage and tread of the chassis should be independent of the width of the fuselage.

It should utilize the forces of flight, since they are always available, for power to retract and extend and such action should be entirely automatic when released by the pilot.

For Engineering data and License apply to

Capt. Jas. V. Martin, Martin Aeroplane Factory, Elyria, Ohio. Business address: 918 Reibold Bldg., Dayton, Ohio

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# SPARK PLUGS

"The Plug with the Infinite Spark"

The advanced design of B-G Spark Plugs has set a new standard of efficiency and increased the reliability of the ignition system beyond the most sanguine expectations of the U.S. Air Service.

The marvelous performances of B-G Plugs in the New York-Toronto race, New York-Trans-Continental race and countless other grueling tests to which the U. S. Air Service has subjected them to proves conclusively that only a plug embodying the self-cleaning feature and con-struction of B-G Plugs could establish such a record.

At the end of every test and performance when the B-G Plugs have been removed from the motor inspection has shown the plugs to be perfectly clean, due to the effective scavenging action.

### BREWSTER-GOLDSMITH CORPORATION

33 Gold Street

New York City, U.S.A.

#### (Continued from page 537)

tests have identically proportioned fuel metering passages; hence it is to be expected that considerable differences will be apparent among the results, considering them from this viewpoint alone.

In plot 7—maximum brake m.e.p. versus barometric pressure—it is seen that no justification can be found for the fuel consumption rate of curve d, plot 4. Not only is fuel wasted at all levels and power lost above 14,000 feet altitude, but the mixtures are so rich at the greatest altitudes as to

but the mixtures are so rich at the greatest altitudes as to cause fouling of spark plugs and combustion chamber walls. In plot 8 are presented the relationships between brake m. e. p. and mixture ratio, with the latter varied through wide limits at each pressure level. The important conclusion to be reached from this diagram is that maximum power output at each pressure level (operating at the rated speed of the engine, is secured with the same ratio of air to fuel in the mixture. Further, the mean cylinder pressures degrees more Further, the mean cylinder pressures decrease more mixture. Further, the mean cylinder pressures decrease more rapidly with a given change in the air-fuel ratio the lower the atmospheric pressure. This points to the need for much closer regulation of the mixture with lowered pressures as compared with the higher. (Note that the mixture ratio for maximum brake m.e.p.'s should have a somewhat lower value than indicated in this diagram, because of the too high

value than indicated in this diagram, because of the too high air readings previously noted.)

The effect of hot-water jacketing of the intake manifold in the engine used (Hispano 150-horsepower) is shown for two sets of test runs in diagram plot 9, these two tests beings fairly representative of the results found in other tests that have been made with this engine. The loss following jacketing of the manifold branching immediately above the carburetor is greatest at the greatest atmospheric pressure, which latter is accompanied by the highest atmospheric temperature, and becomes of relatively less importance, up to 17,000 feet altitude (note curve c, plot 9), as the atmospheric pressures and temperatures become lower. and temperatures become lower.

In these tests a constant intake manifold water jacket temperature of 37° C.=96.8°F. was maintained. In such a case the pumping loss in the engine following heating of the mixture will vary directly with the temperature difference between mixture and jacket and in an inverse manner with the mixture density.

This assumes that the whole of the heat given up by the constant temperature water jacket appears as sensible heat in Of course, this is not realized, since some of the mixture. Or course, this is not realized, since some of the heat taken up by the mixture is used to evaporate the fuel and becomes latent. The proportion of the total heat received which is so used depends upon so many variables, considering different fuels and different carbureting methods, that it is impossible to state the two results in general terms. In any case, the net result only is of importance and its characteristic, as found in these tests, is shown clearly by the curves of plot 9.

It is noteworthy also that, in general, loss in output resulting from manifold hot-water jacketing is accompanied by greater fuel consumption values, regardless of carburetor design and method of control, and with fixed adjustment carburetor de-signs the economy loss following heating in this way may attain quite serious proportions.

#### (Continued from page 528)

The treasurer is Mr. Benjamin Hillman, member of the commission organizing the First Aerial Derby Around the World.

The purposes for which the Aerial Touring Association was organized are as follows:

(1) To organize aerial tours and encourage the use of aircraft throughout the world.

(2) To promote safety in aerial navigation.
(3) To promote the construction of aircraft especially suited for air travel, pleasure and commercial transportation.
(4) To collect and compile reliable data regarding the cost

of operating aircraft lines.
(5) To co-operate with communities, and organizations in establishing airports, flying fields, aerial garages and aero-

establishing airports, flying fields, aerial garages and aeronautic supply stations.

(6) To study the possibilities of air travel in different countries and prepare maps of airways.

(7) To collect and compile information regarding aerial laws and regulations for air traffic of different countries.

(8) To collect and compile meteorological and other useful information about different countries for air travelers.

(9) To establish a clearing house of aeronautic activities where people interested in aerial touring, commercial aerial transportation and air travel can get practical information and assistance.

(10) To establish aeronautic information bureaus throughout the world.

(11) To organize aerial exploration and surveying expeditions.

(12 To co-operate with the Aero Clubs, Aerial League, aerial transportation companies, travel agencies, chambers of commerce, manufacturers and other established organizations and individuals to carry out the above-mentioned purposes and advance the science and art of aerial navigation.

# THE MACHINE YOU WILL EVENTUALLY FLY!!



## MARYLAND PRESSED STEEL CO., (AIRCRAFT DEPT.)

Sales Manager, HARRY E. TUDOR

299 MADISON AVE., NEW YORK CITY

(Continued from page 539)

is approximately a distance of 390 miles, and the liner negotiates this in from four to six hours, depending upon the wind, direction and speed. This is quite different from twenty-six hours in a present-day German train with its attendant discomforts.

Fifteen kilograms of baggage is transported with each ticket, and excess baggage is charged for at the rate of five

marks per kilogramme.

The design of this "Bodensee" is the latest in airships, being at the present date the only truly stream-lined rigid airship actually in commission.

Commercial air navigation is coming, and we must meet that issue very soon. Let us be prepared to choose our course so that we shall make a few mistakes as possible.

Millions of marks have been lost in the beginning, and lives of members of crews have been lost, but let it be said, to the eternal credit of the man with the fixed idea and of his subordinates, that not a single passenger carried on a Zeppelin airship has been injured or killed

and to date the total carried has reached the sum of plus 140,000.

#### Haxton, Col., Organizes Aero Club

Haxton, Col., is proud of its boast that it is the only town of its size in the United States which owns, operates, sells and makes aeroplanes.

The Haxton Aero Club does just that. It was organized last August and since then has perfected the organization, so that now the Club is a going and active concern. It is officered by Leonard Sharpe, President; W. F. Miles, Secre-tary-Treasurer.

#### Canada May Import Bees by Aeroplane

Toronto.—D. Brunne, of the Brunne Apiaries, near New Liskeard, is seeking to arrange through the Aero Club of Canada for aeroplanes to bring him an importation of bees from the Southern States.

It is expected that a large number of bees will be imported into Canada for next year and the Canadian breeders do not want to take chances of getting a strain which might weaken during the winter months. So the desire is that the bees should be imported at the right moment next spring and without an hour loss of time. This is where the speed of the aeroplane is to be turned to account. It is probable that the first cargo of bees to be carried by aeroplane will be carried by Canadian airmen for Canadian beemen. It is proposed also that these flights will be used to test the practicability of delivering bee breeders supply by air.

#### Passengers Must Have Parachutes in Holland

A law is about to be passed in Holland that every passenger in a Government aeroplane must be equipped with a parachute during the flight. In connection with this decision several successful trials have been made with parachutes over the Soesterberg Aerodrome in the last few

#### Plan Air Telegram Route

The Hague-Owing to great difficulties and delays in telegraphic communication between Germany and Holland, a plan is under consideration to send telegrams from Germany to the Soesterberg Aerodrome, Holland, by aeroplane, and thence

to distribute them by motor cycle. telegraphic delay with Germany is so great that ordinary telegrams are sent chiefly by mail.

Flies Over Mt. Owen Range

London.—Captain Ross Smith, the ustralian aviator who recently com-Australian aviator pleted a flight from England to Australia, thereby winning a prize of £10,000, has landed at Charleville, Queensland, after safely negotiating the formidable Mount Owen range, according to advices from Sydney.

The Inland Empire Aero Training Corp. The Inland Empire Aero Training Corporation was incorporated last Fall rather too late to do any flying, but since the incorporation Mr. J. W. Hesser, President of the Company, has succeeded in interesting the public to such an extent that flying fields are now either in actual existence or are arranged for in the following cities. Pilliaga Most Mills City. lowing cities: Billings, Mont.; Miles City, Mont.; Livingston, Mont.; Bozeman, Mont.; Livingston, Mont.; Bozeman, Mont.; Great Falls, Twin Bridges, Dillon, and Butte. The headquarters of the Corporation are in Butte, Mont. The Corporation expect to purchase five planes in addition to those they already have, which will enable them to maintain a personnel and service at different points throughout Montana. In addition to this they expect to put on a schedule route be-tween Butte-Helena and Great Falls, for commercial transportation. Next summer the Corporation will sketch and lay out Airways throughout the State in cooperation with the Forestry Department. A passenger-carrying liner will also be operated between Livingston, the railroad center, and Gardiner, the gateway to the Yellowstone Park.

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the Skies

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going to happen to-morrow on a commercial scale.

A big national advertiser will put one of the biggest advertising coups over when the first commercial liner jumps from New York to San Francisco, if he negotiates an arrangement to have a thousand aerial messages dropped over every important city enroute. We have scores of suggestions as to how this should be done, and we are closely in touch with the projected plans for Trans-Continental air trips, and the possibilities of utilizing them for aerial advertising.

Furthermore, there are scores of exhibition and passenger carrying services organized throughout the country that we can link up to your advertising department. Just tell us your business and we'll map your plan.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to Aerial Routes in the United States furnished on application.)

# THE NATIONAL LIBERTY INSURANCE CO. OF AMERICA

FIRE THEFT COLLISION Insurance and Immediate Adjustments

CHARLES H. PAYNE

AERO PROTECTIVE ASSOCIATION. Inc. PAYNE & RICHARDSON, Inc.

Manager Aviation Department

NATIONAL LIBERTY INSURANCE CO. 62 William Street, New York City

**BRANCH OFFICE:** AVIATION DEPARTMENT 280 Madison Avenue Telephone, VANDERBILT 322

(Continued from page 528)

quire their own aeroplanes and it became necessary to rent To cover the rental expense cash prizes amounting to \$5,500 were offered and whereas aeroplanes were scarce and some of the aviators who rented their planes to representatives of universities would not risk letting strangers pilot them, special rules were adopted for those contests, permitting the colleges to enter the aeroplanes instead of entering

ting the colleges to enter the aeroplanes instead or entering the pilots.

After consulting the representatives of different colleges it has been decided that this year the rules will require college men to enter and pilot their own machine.

The contests will be held under the rules of the International Aeronautic Federation, which have controlled all aeronautic sports during the past fifteen years and all competitors will be required to hold the international pilot certificate which is issued in the United States by the Aero Club of America.

The Club has issued aviation pilot certificates, balloon pilot certificates and dirigible certificates to college men during the past three years, and finds that hundreds of these

ing the past three years, and finds that hundreds of these pilots are anxious to participate in intercollegiate contests.

In the contests held last year the following colleges were

represented:
Harvard, Yale, Princeton, Columbia, Dartmouth, Pennsylvania, Amherst, California, Nebraska.

sylvania, Amherst, California, Nebraska.

For this year's contests entries are expected to represent the following leading universities:

Harvard, Yale, Columbia, Cornell, Princeton, Amherst, Pennsylvania, Rutgers, Williams College, Massachusetts Institute of Technology, Colgate, Dartsmouth, University of Texas, Lehigh, University of Michigan, University of Minnesota, Syracuse University, Ohio University, University of Chicago, Boston College, University of Pittsburg, University of North Dakota, University of Cincinnati, University of Oregon, University of Missouri, Brown University, University of Vermont, Washington and Jefferson College, West Virginia, Georgia Institute of Technology, Bowdoin College, University of Wisconsin, University of California, Center College.

Award of Intercollegiate Aeronautic Medals of Merit Continued

Besides offering the trophies and prizes for intercollegiate flying contests the Aero Club of America and the Aerial

League of America will again, as was done in 1916, 1917, and 1918 offer "Intercollegiate Aeronautic Medals of Merit" to be awarded to the undergraduates of twenty universities and colleges who write the best essays on the subject of

aeronautics.

The Aero Club of America has set aside a fund of \$1,000 for these "Intercollegiate Acronautic Medals of Merit."

This will make the ninth year of intercollegiate aeronautic activities under the auspices of the Aero Club of America and is expected to be the star year. The Club first undertook to introduce aeronautic activities in colleges in 1912, when no university had as yet taken up aeronautics. The efforts of this first year resulted in interesting the Massachusetts Institute of Technology in the subject and led to the establishing of a course in aerodynamics in that Massachusetts Institute of Technology in the subject and led to the establishing of a course in aerodynamics in that institution. In 1914 a committee of Aero Club of America officials visited Yale by invitation and arranged for the organization of the Yale Aero Club and later assisted in the formation of three Yale Aero Units, two Harvard Aero Units, a Columbia Aero Unit, and a Princeton Unit, and in the aeronautic activities of close to one hundred universities and colleges.

and in the aeronautic activities of close to one finite autivities and colleges.

The Aero Club and the Aerial League assisted 6,000 college boys to join the U. S. Army and Navy Air Service and assisted financially and in other ways in training college men to prepare them for the air service.

# Six Thousand College Men Took Out A. C. A. Pilot Certificates

A concrete idea of the great interest in the aeronautic activities of the Aero Club of America and the Aerial League of America can be had from the fact that 1,280 college men, mostly ex-Army and Navy pilots joined the club during the past twelve months and over two thousand joined the Aerial League of America during the past six months. Four thousand five hundred college men took out the Aero Club of America aeronlane pilot certificates, eight the Aero Club of America aeroplane pilot certificates, eight hundred and ten took out free balloon pilot certificates, seven

hundred took out the seaplane pilot certificates, and one hundred and twenty took out dirigible pilot certificates.

There are, therefore, six thousand college men who are qualified to participate in the Intercollegiate Aerial Contests being organized by the Aero Club and the Aerial League of

America.





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Send \$5.50 for either of our 7-sheet set of R. C. J. Motored Monoplane or tractor Biplane Sporting Model Blue Frints (1920 models). The blue prints are the most complete set of prints offered to the airplane builder. Instructions on how to build included.

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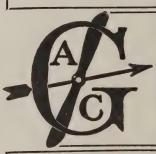
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# WEEKLY

ol. 10, No. 15

**JANUARY 26, 1920** 

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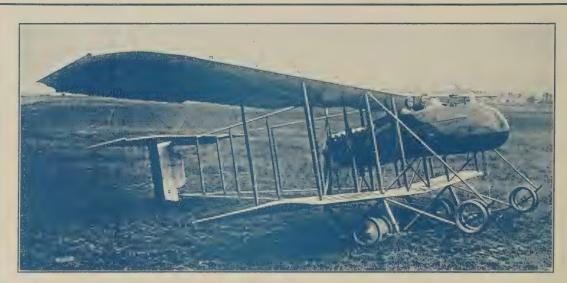
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\$10,000,000 In Orders for Civilian Aeroplanes in Two Weeks!

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THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO., January 26, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, JANUARY 26, 1920

NO. 15

# \$10,000,000 IN ORDERS FOR CIVILIAN AEROPLANES IN TWO WEEKS!

TE printed in the last issue the press dispatch from Chicago stating that 1,700 aeroplanes were sold to civilian purchasers, for civilian use, at the Chicago Aero Show and reference was made to the business to be had in Latin-American countries.

The following statement from the Curtiss Aeroplane and Motor Corporation gives interesting details regarding large orders secured by this enterprising firm at Chicago and in

Latin-American countries:

"With the closing of the Chicago Aeronautical Show today word comes from Chicago of sales of commercial aeroplanes by the Curtiss Aeroplane and Motor Corporation in the West

by the Curtiss Aeroplane and Motor Corporation in the West and Far West far exceeding anything on record and promising an increasing aerial activity in passenger and merchandise carrying for 1920. Among the sales is that of two eight-passenger Curtiss Eagles to the Humphreys Aeroplane Company, of Denver, Colorado, for passenger lines between Denver and Estes Park. The largest sale is one to Walter Brookins, of the Southwest Airplane Company, of Tulsa, Oklahoma, of 447 aeroplanes, representing a value of \$2,500,000.

"The Curtiss exhibit at the Chicago show has been composed of the planes which are included in these sales: The Curtiss JN, the Curtiss-motored Standard J-1, the three-passenger aeroplane, the Oriole, the flying boat Seagull, and the eight-passenger limousine aeroplane, the Curtiss Eagle. Some of the sales just concluded have been under negotiation for some time. The sale of 447 aeroplanes to Brookins, 200 of them Orioles and Seagulls and the remainder Curtiss JN-8s, was negotiated by J. M. Bickel, assistant sales manager of the Curtiss organization. Bickel has also placed Curtiss Orioles with Dr. F. A. Brewster, of Beaver City, Neb., who will use the new Curtiss machine for long-distance professional trips, and to Robert McMurray, of Chattanooga, Tenn.

"One of the features of the recent Curtiss sales was the

will use the new Curtiss machine for long-distance professional trips, and to Robert McMurray, of Chattanooga, Tenn.
"One of the features of the recent Curtiss sales was the fact that the first saleswoman to handle aeroplanes was concerned with placing some of the orders. She is Miss Laura Bromwell, who recently completed a flying course at the Curtiss Garden City flying school, and has determined to apply her experience as a pilot to the work of marketing air-

"In addition to the Eagles, which will go to Colorado, there have been placed with the Denver company ten Curtiss Orioles which will be used for sightseeing in the vicinity of the city of Denver. Denver has established a municipal landing field

a mile square, and interest in aviation, despite the altitude and its discouragement to flyers, has become intense.

"Curtiss officials believe that the sale and distribution of over 450 aeroplanes in the West will have a profound effect upon practical aviation. With the other orders already placed, the present sales will stimulate interest in landing fields and means the establishment of good air roads throughout the central part of the country. They will also mean the establishment of regular aeroplane services between certain points. In addition to aerial lines, aeroplane depots, such as have operated during the past year, will be established at new centers.
"'The sale,' states Sales Manager John P. Davies, of the

Curtiss Aeroplane and Motor Corporation, 'vindicate the claims we have made that aeroplanes are safe, economical, and comfortable carriers for a number of types of traffic. The best proof of such a contention is the use of the planes and the fact that after a thorough tryout in 1919 the public is giving unprecedented orders for 1920 speaks sufficiently for itself.

#### "American Aircraft in Eastern Markets

"The first shipment of American aeroplanes to China and the first introduction of American planes to the possibilities which were recently indicated by the contract of \$8,000,000 for military aircraft let by the Chinese Government to Vicars & Company were represented in the \$500,000 aerial consignment taken by the steamer 'Dacre Castle' to Capt. C. E. W. Ricou, of Hong Kong and Macao. The most important features of the shipment were five Curtiss H-16 flying boats, two Curtiss HS2L flying boats and four other seaplanes of Aeromarine and Boaing design.

and Boeing design.

"The purchase of American planes by a former captain in the French aviation service is partly the result of the rapid delivery which could be secured in this country. It is also believed to have been influenced by the quality of American seaplanes, which in the NC-4 and other types have shown their remarkable seaworthiness. Captain Ricou has engaged American pilots and mechanics—seventeen in all. All of these have served in the United States Navy or at Curtiss plants or flying fields. They will operate the American flying boats as merchandise and passenger carriers along the Chinese coast and

between China and the Philippines.

#### "Curtiss Activity in the Far East

"This is by no means the first time that American planes have been sent to the Far East. In Japan and the Philippines the Curtiss organization has been active as early as 1913. The first scaplanes used by the Japanese navy were introduced to Japan by Glenn H. Curtiss, inventor of the hydroaeroplane and flying boat.

"During the present year the Curtiss Aeroplane and Motor Corporation has also been active in Japan and the Philippines, where it has placed machines of the JN, Oriole and Seagull types under the direction of its Eastern sales representative, Major J. E. H. Stevenot. During the past year a total of seventeen machines have already been sent and more are under order for shipment.

#### "Captain Ricou's Aircraft

"The H-16 and the HS2L types of flying boats are important seaplanes developed for the American Navy during the great war. The former has a wing span of 96 feet and is powered by two Liberty motors; the latter is 74 feet from tip to tip and employs a single Liberty 400 h.p. engine.

"The capacity of these seaplanes for commercial carrying will be considerable. The H-16 has a carrying capacity, exclusive of fuel for 675 miles at economical speed, of ten persons.

sive of fuel for 675 miles at economical speed, of ten persons.

The HS2L, with fuel for over 500 miles, can carry a load equal to five persons. Merchandise can, of course, be substituted for passengers.

"The distance from Canton to Manila is 600 miles, and other parts of the Philippines are nearer to the Chinese coast

by over a hundred miles.

"Additional Features of Shipment

"In addition to the eleven flying boats being sent, there are contained in the consignment sufficient aerofoils to re-equip ten of the eleven boats, ten complete extra motors, one hundred propellers (as extras), dope, glue, fabric, etc. Considerable auxiliary equipment such as trucks for handling the shipment, hangar and motor shop machinery and tools, etc., is included. There are 144 small boxes containing boats and machinery, most of them as large as small cottages.

#### "New Orders in Process

"Captain Ricou has already prepared a second order of aircraft to supplement the first. He has believed in the possibilities of air traffic in China since before the war.

"The present order was the indirect but immediate result of his meeting Guy T. Slaughter, of the shipping firm of Guy T. Slaughter & Co. Captain Ricou and Mr. Slaughter came to gether last August, and efforts were immediately made to secure quick deliveries of reliable seaplanes. Arrangements were soon completed to purchase United States Navy equipment, Curtiss machines being selected whenever possible, according to Mr. Slaughter's statement.

"South America Buys Aeroplanes"

"South America Buys Aeroplanes

"What is believed to mark definitely the establishment of aeronautical trade between the United States and South America occurred today when the Sao Paulo police force of Sao Paulo, Brazil, cabled an order for nine Curtiss JN and Oriole aeroplanes, totalling \$57,000, and making a total of \$205,000 in aeroplanes and flying boats placed in South America by the Curtiss South American mission since last August. The Curtiss activity marks the re-establishment of American influence in flying operations in Latin-America, as during the war the Southern republics had begun to turn toward Europe for aeroplanes.

"Five types of American machines have now been placed with government or private interests in Brazil, Bolivia, Argentine, and Chili. They are the Curtiss Wasp, sold to the Bolivian Government, the Curtiss JN, placed in all South American countries, the Curtiss-motored Standard J-1, the Curtiss Oriole, and the Curtiss Seagull, the last two placed in Brazil, Argentine, and Peru. Mr. C. W. Webster is the director of the Curtiss South American mission."

Large Orders Secured By Other Manufacturers and Dealers

The Interallied Aircraft Corporation, of New York, which sells imported Avro and Sopwith machines, finds the demand so extensive that they are arranging for increased import of planes to meet the demand.

The American-French Aero Corporation, Inc., who have bought a factory at Newark Valley, N. Y., to manufacture aeroplanes, parts and supplies, already have orders for two

The Cantilever Aero Corporation is another firm that has obtained substantial business from advertising in AERIAL AGE.
We quote herewith the following letter from Mr. McCorry: January 13, 1920. Editor, AERIAL AGE.

Dear Sir:—Our advertisement in Aerial Age has been so productive of inquiries from prospective purchasers of aero-planes that we are at a loss to know what to do to satisfy the pressing demands that are being made upon us from purchasers from almost every state in the Union.

We believe that in advertising, and the result of our ad in Aerial Age has so far surpassed our most optimistic ideas of what the future holds for aviation, that I want you to share with us our enthusiasm as to the results of our advertising in your baper.

with us our enthusiasm as to the results of our advertising in your paper.

Dr. Christmas and myself have just returned after an extended trip to the South and Middle West, where we found more ready purchasers for aeroplanes than all the manufacturers combined could hope to satisfy within the next year.

Aerial Age has always been a strong, forceful booster for the future of commercial aviation, and I am sure that you will be gratified to learn that the demand for commercial aeroplanes is, in large measure, due to the education which your subscribers have received from the columns of your valuable baper. paper.
Dr. Christmas joins me in extending all good wishes for your continued success duirng this year.

Yours very truly, ALFRED E. F. McCorry, General Manager and Treasurer,

None of the above were given in the reports of large sales of aeroplanes for civilians printed in recent issues of AERIAL

#### AVIATION COMMISSION OF STATE OF NEW YORK HAS SUBSTANTIAL PLANS

N January 17th were held the first hearings of the Aviation Commission of the State of New York, which includes prominent aeronautic authorities, as follows: Chairman, Col. Jefferson de Mont Thompson, president of the Aero Club of America; members, Alan R. Hawley, pioneer leader of the aeronautic movement; Frederick H. Allen, U.S.N.R.F., who was one of the Lafayette Flying Corps and was overseas in an executive position in the U. S. Naval Air was overseas in an executive position in the U.S. Naval Air Service; Henry Beaumont Hertz, Frank S. Voss, Robert Graves, Chauncey D. Hakes.

Service; Henry Beaumont Hertz, Frank S. Voss, Robert Graves, Chauncey D. Hakes.

Among the authorities invited to give their opinion to the commission are: Orville Wright, Glenn H. Curtiss, Rear Admiral Glennon, Rear Admiral Fiske, Henry Woodhouse, Major General Charles T. Menoher, U.S.A.; Col. A. R. Christie, U.S.A.; Major F. H. La Guardia, Commander Hon. Murray Hulbert, Lieut. Com. P. N. L. Bellinger, U.S.N.; Rear Admiral Marl: L. Bristol, U.S.N.; Col. G. C. Brant, U.S.A.; Major J. C. McCoy, Com. H. C. Mustin, U.S.N.; Major Thorne Deuel, U.S.A.; Col. Thomas Duncan, U.S.A.; Brig. Gen. Robert K. Evans, Major Kruesi, Col. H. L. Watson, U.S.A.; Lt. Com. John L. Callan, Lt. David H. McCulloch, Lt. Col. Arthur R. Carmody, Capt. Jacques M. Swaab, Major August Belmont, Col. E. Lester Jones, Major Harry A. Bubb, Col. Charles deF. Chandler, Col. Philip A. Carroll, Mr. Elliott C. Cowden, 2nd Lt. F. T. Davison, U.S.N.; Major Fred Libby, Major Howard L. Goodhart, Major C. C. Goodrich, Albert Kean, Col. Frank S. Lahm, Fabian Korber, Lt. R. A. Lovett, Capt. R. M. Olyphant, Jr., Lt. Herbert Pulitzer, Major Charles J. Glidden, Gen. George W. Goethal, W. W. Mountain, C. Douglas Wardrop, John M. Larsen, Major Reed G. Landis, Lt. Ralph Pulitzer, Bernard H. Sandler, Howard A. Scholle, Lawrence B. Sperry, A. Leo Stevens, M. B. Sulzberger, Capt. Roger B. Whitman, Lt. Chas. J. Wrightsman, W. W. Miller, Bion J. Arnold, Lieut. Herbert Pulitzer, Major Thomas S. Baldwin, Lt. Godfrey L. Cabot, Major Max C. Fleischmann, Major Robert Glendinning, Major A. B. Lambert, Glenn L. Martin, Earle L. Ovington, Ernest R. Preston, Major John M. Satterfield, Frank A. Seiberling, Joseph A., Steinmetz, Capt, John B. Stetson, Jr., Harold E. Talbott, Jr., Lt. Col. William Thaw, Ralph Upson, J. B. R. Verplanck, Lt. Col. Jessey Gur-

ney Vincent, Charles C. Witmer, Com. John H. Towers, George Scraggs, Major Victor H. Dumas, Col. Steicher, Major J. C. Phipps, Capt. Eddie Rickenbacker and the commanding officers of the U. S. Naval Air Stations and U. S. Army Air Stations.

In the absence of Colonel Thompson, Mr. Hertz presided. An efficient and most complete plan of organization had been prepared by the commission and opinions were requested on

prepared by the commission and opinions were requested on same, as well as on any phase of aeronautic activities.

Those present included: Rear Admiral James H. Glennon, commandant of the Third Naval District; Rear Admiral Bradley A. Fiske, the noted naval strategist; Commander Douglas, commandant of the Rockaway Naval Air Station; Lieutenant Langley, U.S.N.; Henry Woodhouse, Peter Cooper Hewitt, famous inventor; Major Kruesi, late U.S.A.; Bernard H. Sandler, noted attorney; G. Douglas Wardrop, managing editor of Aerial Age Weekly; F. L. Faurote, of the Curtiss Aeroplane and Motor Corporation; Herbert Pulitzer, Lieut. Howard A. Scholle, Major Redondo Sutton, former U.S.A. military aviator; Dr. Charles V. Paterno, noted constructor and supporter of aeronautic progress, member Board of Directors Aerial League of America; Fabian Korber, leading French authority on lighting of aerodromes and aeroplanes for night flying; Lieutenant Vandewater, U.S.N.; John Hays Hammond, Jr. Hammond, Jr.

The authorities present endorsed the plan to start aeronautic activities in the state under a central commission as pro-

posed by the plan submitted.

posed by the plan submitted.

Admiral Glennon, in expressing appreciation for the commission's pioneer work, stated that it would do much to encourage the development of aeronautics.

Admiral Fiske reminded those present that the creation of the naval reserve air forces was started by the Naval Militia of New York, under the auspices of the Aero Club of America, and resulted in the formation of a number of units of the Aerial Coast Patrol, which were trained at private expense and two hundred members of these units were taken over by the Navy in the early part of 1917 and given commissions and were among the first American aviators to go overseas.

Each of the authorities present gave their advice and suggestions in different branches of aeronautics. A complete account of their statements would make an interesting book.

The commission is continuing the hearings, which are to be held Mondays, Wednesdays and Saturdays.



# THE NEWS OF THE WEEK



#### Air Line Ticket, \$37.52—Major Landis Figures Cost of Chicago-New York Trip

Chicago, Jan. 13.—Major Reed Landis estimates that an aeroplane carrying 25 passengers can afford to carry them from here to New York in eight hours at \$18.76

here to New York in eight nours at \$16.70 a head.

This estimate includes operation and upkeep of the machine, an office force, and the maintenance of two reserve machines. Allowing 100 per cent. profit, he puts the price of a ticket for the non-stop flight at \$37.52, 52 cents cheaper than the cost of a ticket on the best railroad train now running. The aeroplane could beat this train by twelve hours. The air trip will beat the slower and more moderate will beat the slower and more moderate priced trains by twenty-one and a half hours and will exceed them in the cost per ticket by only \$8.12.

#### \$2,500 for Air Film As Propaganda

The first showings of the "Great Air The first showings of the "Great Air Robbery," a film put out by the Universal Flm Mfg. Co., and featuring Ormer Locklear and Curtiss JN's in a story of the aerial mail, has achieved remarkable success. First showings are now being made at Chicago, where the Aeronautical Show is just closing, and at Minneapolis. In the latter city the Minneapolis Aero Club has paid \$2,500 a week for the right to use the film for aviation publicity.

This unprecedented action indicates the remarkable character of the film. It is

remarkable character of the film. It is



Miss Volara R. Nelson, the first American Aviatrice to secure the Expert Pilot's license of the Aero Club of America

prophetic of a rapidly approaching time when aeroplanes are as common as "jitneys." Ormer Locklear, as the air mail pilot Cassidy, is involved in a story of genuine dramatic quality to which air mail stations, elaborately equipped hangars, wireless telephones, aerial police, gars, wireless telephones, aerial police, etc., furnish a novel background and bring a realization of the progress of practical flying, hard to get in any other form save that of practical experience.

#### Another Use for the Aeroplane

Aircraft has invaded a hitherto unexplored field of activity—discovered a scientific truth in midair. From time immemorial inhabitants of Salt Lake City, Utah, have accepted the theory that a smeltery, located about seven miles away, was the source of a disagreeable smoke that hovered over the city. The belief prevailed that smoke from the smelting plant being of superior density to coal smoke the latter was crowded out to the detriment of the citizens.

Salt Lake City being located in a valley the credulity of the theory was further fortified to the effect that unsavory fumes contributed to an otherwise wholesome atmosphere. Science, ever ready to ex-plode theories not surely entrenched by the acid test of analysis, through its representative—the U. S. Bureau of Mines—made an experiment. G. St. John Perrott, a chemist of the government who formerly served in the Aircraft Division of the Army, obtained an airplane for exploitation. By the aid of a vacuum bottle the smoky atmosphere immediately above the western city. Subsequently chemical analysis disproved the accepted opinion that coal smoke is less dense than fumes from the smeltery—no trace of an atmosphere beclouded by fumes from the subship furnaces was present. Consequently of the subship furnaces was present. sulphur furnaces was present. Consequently, Salt Lake City will have to attribute responsibility for an excess of smoke to other sources.



General view of the exhibits of the Chicago Aeronautical Exposition at the Coliseum

#### Naval Aircraft Factory Requires Draftsmen

In connection with the rigid dirigible of the Zeppelin type to be constructed at the Naval Aircraft factory, Philadelphia, the following list of employees additional to those at present at the Naval Aircraft factory have been authorized (number, rating, pay): 1 Chief Draftsman, \$13.60 per diem; 5 Draftsmen, Chargemen, \$10 to \$12; 12 Draftsmen, Grade "A," \$8 to \$9.60; 19 Draftsmen, Grade "B," \$6 to \$7.20; 10 Draftsmen, Grade "C," \$5.20; 7 Copyist Draftsmen, First Class, \$4 to \$4.80; 1 Weight Clerk, \$4.40 to \$5.60.

Commander G. C. Westervelt is very desirous of establishing an eligibility list from which men of the proper qualifications may be called in for work on this rigid dirigible as their services become necessary. It is probable that all of the men above referred to will be required within the next four or five months.

The applicants should have the qualifications of aeronautical draftsmen, naval architectural draftsmen, mechanical en-gineering draftsmen and electrical engi-neering draftsmen, in this order of desirability, and their varying degrees of experience in these professions would fix their classifications with regard to the grades above mentioned.

Those interested in the opportunities presented should communicate with Commander Westervelt, Naval Aircraft Factory, Philadelphia.

#### Rome-to-Tokyo Flights to Start Before January 20

Rome.—Everything is in readiness for the proposed Rome-Toyko aeroplane flight, and with or without the participation of Gabriele d'Annunzio it should be completely under way not later than January 20, it is declared by Colonel Berliri, the Director General of Aeronautics in an interview in the Tribuna.

A delay beyond the date named, Colonel Berliri points out, would carry the effort into the monsoon season. It would not be advisable, either, to postpone the flight until next fall, Colonel Berliri said, as the Aero Club of America was organizing a round-the-world flight, which would throw the Rome-Tokyo plan into the shade.

Aeroplanes Profit Banking

Aeroplanes are to be used in French Aeropianes are to be used in French Guiana for the transport of gold from the mines at St. Laurent du Maroni, which is separated from the coast towns by a 100 miles' belt of almost impenetrable forest. In Brazil aeropianes are to be used regularly for the conveyance of gold to the widely scattered branch banks. A regular service of Handley Pages is being organized. The saving to the banks will be very great, for, on account of the vast distances and difficulty of transport, local branches have hitherto had to keep a gold reserve out of all are had to keep a gold reserve out of all proportion to the business done. aeroplane service, however, the conditions will more closely resemble those obtaining in well-developed countries such as England and America. Yet another highly remunerative service for aeroplanes has been discovered; it is in the conveyance of securities from one place to another. On one occasion recently a Handley Page on one occasion recently a flamtury rage in Brazil, by saving a whole week, secured a net saving of £1,000, this sum representing one week's interest at 5 per cent. on one million pounds worth of securities. In Brazil, Chili and the Argentine the opportunities for this sort of thing occur frequently and regularly. The Handley Page service that is being organized will at first be manned by 50 cent. Brazilian and 50 per cent. British.

#### Parachute Works Successfully at an Altitude of Only 400 Feet

The Air Service Engineering Laboratory, Dayton, Ohio, recently demonstrated the successful use of parachutes as a means of safe exit from an aeroplane in full flight, which will eliminate many dangers which have been a bugaboo to

The parachute drop was made from a DH-9-A plane, Liberty motored, flying over 100 miles per hour at an altitude of 400 feet.

The parachute with a 200-pound loading opened in one and one-half seconds and reached the ground in 20 seconds with its living load with no oscillations whatever.

From time to time it has been demonstrated that successful drops could be made at high altitude but at an altitude of only 400 feet with a high powered plane such as a DH-9-A it is considered remarkable.

The parachute used was a reconstructed Martin flat topped with a spread of 27 feet when fully opened.

Major Rudolph W. Schroeder, Chief Test Pilot of the Air Service Engineering Laboratory at Dayton, Ohio, and Lieut. George W. Elsey his assistant, while fly-ing a Le Pere aeroplane in a recent at-tempt to break the world's altitude record had a most remarkable experience.

Major Schroeder Encounters 150-Mile

Wind

Major Schroeder holds the world's altitude record with a passenger. His airplane is equipped with a new regulating device which was being tested for extreme high altitudes. He and his observer while testing this device reached an altitude of 18,000 feet and encountered such a high wind that the plane, which is equipped with a 400-horsepower Liberty motor and capable of making a speed of 139 miles per hour, was blown backward at a rate of 15 miles per hour. He was finally compelled to dim his aller. compelled to dive his plane to a lower altitude in order to get back to his field. It is estimated that the wind was in excess of 150 miles an hour.

#### 280-Pound Man Given Aeroplane Ride

Mr. Henry Fox, who was given a flight over Washington, D. C., January 6th, has the distinction of being the heaviest man who ever had a ride in an airplane. He weighs 280 pounds. The flight was made over Bolling Field in a DH Honeymoon Expres piloted by Major W. C. Ocker.

#### Woman Secures Expert Pilot's License

Miss Volara R. Nelson, who received her final tuition at the Philadelphia Aero Service Corporation School, has just qualified for her expert pilot's license from the Aero Club of America, and in doing so has secured the distinction of being the first woman to hold this certifi-FC Davis was her instructor at the Philadelphia school.

Miss Nelson is an enthusiastic devotee of the sport of aviation and contemplates taking her place in the exhibition field immediately.

#### Personal Par

John Cetrule, who was formerly stationed at the plant of the Wright-Martin Aircraft Corporation, Long Island City, N. Y., as an inspector in the aviation section of the Signal Corps, has been transferred to Camp Nyssa, Farmingdale, N. Y., where he is serving in the motor transport division of the Reserve Officers' Training Corps.



Interior views of two of the pleasure aircraft at the Chicago Show, Left, the Curtiss Eagle; right, the Dayton-Wright Coupé

# AERO CLUB OF THE NORTHWEST DOING EXCELLENT

THE Seattle Flyers' Club has joined forces with the Aero Club of the Northwest and both organizations are continuing together, under the latter's name, great pioneer work which the Acro Club of the Northwest had started many

years ago and the activities which the Flyers' Club had started last year.

Paul Coles and Norman Coles, his brother, and both aviator in the U. S. Air Service, called the first organization meeting of the Flyers' Club. Paul, who had one of the most interesting organization of the flyers' Club. had one of the most interesting careers of all American flyers, with numerous smashups in his early training in the old ups in his early training in the old Standards at Kelly and other Texas fields, several Hun planes to his credit, and the final experience of being shot down in the Argonne Drive, winning a Citation and recommendation for the D. S. C., was elected President. Norman Coles, Lt. Arthur E. Carmody of the Royal Flying Corps, and D. C. Keller, U. S. A., were the other officers. other officers.

the other officers.

The first regular election following, Lt. Teel Williams, U. S. Air Service, was elected President; Lt. Paul Coles. Vice-President; Lt. (j. g.) E. L. Van Houten, Secretary and Treasurer. Their crowning effort was the luncheon and entertainment to the Around the World Derby Committee when visiting Seattle.

The Aero Club of the Northwest, headed by Mr. W. E. Boeing, who has pioneered aviation in this section of the country, had done great work. During the war this organization, comprising a membership of prominent local business men, rendered invaluable co-operation to

the Air Service both through furnishing information on spruce problems of this State, the promotion of the manufacture of aeroplanes, and an information bureau maintained for Air Service men. The Club is affiliated with the Aero Club of America, which as sole representative of the International Aeronautic Federation, sanctions all aeronautic events in the United States and possessions.

On the invitation of Mr. Boeing, and after numerous conferences with the flyafter numerous conferences with the flyers, this was accomplished, and the Aero Club of the Northwest was evolved with the following officers: Lt. Teel Williams, President; Lt. Paul Coles, Vice-President; Lt. (j. g.) Van Houten, Secretary and Treasurer, and the following Trustees: Judge George Donworth, Reginald H. Parsons, S. V. W. Peters, W. E. Boeing, Charles Bebb, H. W. Haigh, Arthur Carmody, E. L. Van Houten and D. E. White.

E. White.
The first announcement of the new The first announcement of the new Club was the proposal of an Aerial Derby to Alaska to be held early in the coming summer. The idea has been generally prevalent in the section of the country east of the Rockies that Alaska is rock and ice bound and extremely difficult of access. As a matter of fact, all the Southeastern and Southwestern ports of Alaska because of the kindly offices of the lange Current have a milder climate than Japan Current have a milder climate than our own Atlantic Coast States of Massa-chusetts, New Hampshire and Maine, of lower latitudes.

It is not only practicable to fly to Alaska, but the route will undoubtedly

prove to be one of the safest traveled by air in the entire United States. There is not a single minute of the flight outside of a safe glide to a sheltered landing.

Of course, this route is within the exclusive realm of the seaplane, and it is the plan of the Derby Committee to so shape the conditions of the race as to bring into entry all types of seaplanes that can be used to commercially develop our Northern Territory. In other words, it is tentatively planned to have one race for speed, one for passenger-carrying planes, and one race for freight carriers.

The first announcement printed in the Seattle Post-Intelligencer has brought several hundred clippings from all parts of the United States and Canada, and inquiries from possible entrants from as far south as Texas and east as the State of Massachusetts. Capt. Sir Arthur Whitten Brown, now the only man living who has stood on the shores of America who has stood on the shores of America and the shores of Europe in the same day, wrote to us from San Francisco ask-ing us to cable him at Yokohama the plans ing us to cable him at Yokonama the plans for the race, that he might consider bringing a plane from London—either a Vickers "Viking" or "Valentia"—to Seattle for the Derby. The climax was capped when shortly following this letter we received a wire from Cliff Durant, the facety of the control of the cont mous millionaire automobile racer, son of the owner of the Chevrolet Motors Company, and neophyte aviator, requesting place as the first entry in the Alaska

This is all before the Committee has (Continued on page 564)



Views of the Chicago Aero Show exhibits. 1. Inter-Allied showing of "AVRO" biplane; 2. Dayton-Wright pleasure machines, and Goodyear pony blimp; 3. Caproni, Edstrom and Hamilton exhibits; 4. The Brewster-Goldsmith spark plug



New Los Angeles Company

The Kinner Airplane & Motor Corporation has been organized for the purpose of manufacturing aeroplanes and they are of manufacturing aeroplanes and they are planning to specialize in one and two-passenger general utility machines. They expect to be in production by February 15th. The officers of the company are as follows: W. B. Kinner, president and general manager; C. M. Kinner, vice-president; H. M. Russell, secretary and treasurer; Kenneth G. Barnes, assistant general manager, and H. T. Johansen, superintendent. superintendent.

#### French Buy Planes Here for Orient

French interests operating aero passenger lines in the Orient have purchased in

ger lines in the Orient have purchased in this country eleven aeroplanes, spare parts and supplies, valued at \$400,000. The shipment is now on its way to San Francisco, whence it will be sent to Japan, China and the Philippines.

This is the first commercial shipment of aeroplanes sent by American manufacturers to the Orient. The Chinese government recently purchased British war machines valued at \$40,000,000. Pilots and mechanics to be used in the Oriental and mechanics to be used in the Oriental passenger service will be recruited in this country and will leave San Francisco on board the steamship Dacre Castle.

Aerial Freight Planned

It is reported that the Canadian Pacific Railway has asked for a charter to operate an aerial freight-and-passenger service in Chicago.

#### Shows Plane That Flies Straight Up

A plane which rises vertically in the air, sustaining itself by rapidly revolving air, sustaining itself by rapidly revolving horizontal propellers, was demonstrated by its inventor, William J. Beach, an Australian, in his workshop at 125 East Twenty-third street.

Mr. Beach, who has been flying since 1908, and has designed machines on more conventional lines, believes that his ma-

conventional lines, believes that his machine, when built in normal proportions, stands a good chance of winning the prize of \$100,000 offered by M. Michelin, through the Aero Club of France and the Aero Club of America, for the first machine of this type which shows itself capable of rising vertically from a space about the size of a small roof. The principal advantage of this type of machine is that it can land in a small space, while an aeroplane of the ordinary type requires a landing field.

The governing principle, which Mr. Beach says is original with him, is in the propeller rotation. Instead of one motor working directly on the vertical shaft, he has two rotary motors which rotate in a circle beneath the propellers around a circumference almost as large as that described by the propeller tips. By removing the motors from the direct centre to a circumference, Mr. Beach says, it is possible to cut down the amount of power necessary to rotate the shaft at great speed. Each propeller has two little motors, driven in the case of the model by compressed air and in practice by gasoline.

#### Doehler Elects Officers

At the annual meeting of the Board of Directors of the Doehler Die Casting Company, held at its main office, Brooklyn, N. Y., on January 5th, the following officers were re-elected:

H. H. Doehler, President; H. B. Griffin, Vice-President; O. A. Schroeder, Treasurer; O. A. Lewis, Assistant Secretary.

They also added to their list of officers, the following:

J. Kralund, 2nd Vice-President, in charge of production, and Charles Pack, Secretary and Chief Chemist.

# Curtiss Activity at Miami and Palm Beach

The Curtiss flying station at Miami has opened for the winter. Under direction of E. H. Ballard, a flying school and a passenger-carrying service were begun December 22nd with two Curtiss ORI-OLES and two Curtiss-motored Standard At Palm Beach, close by, the Trans-Oceanic Company is operating a flying boat station employing Curtiss SEA-GULLS, HS-2L's, and H-16's. Two flights have been made to Cuba.

#### (Continued from page 563)

actually completed its plans, which it is hoped will be ready for announcement by

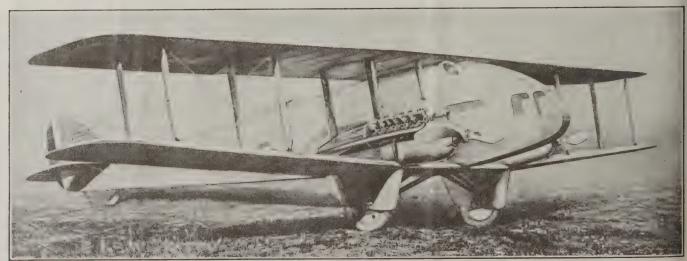
February 1.

The next undertaking of immediate importance of the new organization was the raising of enough sentiment in favor of raising of enough sentiment in Tayor of a municipal landing field to place a \$500,-000 bond issue on the ballot at the coming spring election. This was no easy task. The officers of the Club appeared before the Seattle Chamber of Commerce and Commercial Club, and before the City Council four or five times before the City Council four or five times before this was accomplished. An ordinance is in preparation by the Corporation Counsel and the issue will be voted upon in March. The amount is so much because of the physical handicaps of this country for aviation. There are ideal air conditions here, and we have an ideal location as a terminus we have an ideal location as a terminus for both transcontinental mail and Alaska mail. But there are actually people within twenty miles of this city who have never seen an aeroplane.

This landing field bond issue fight naturally is the biggest thing the Club has on its hands, but incidentally we are conducting a campaign for 3,000 members, preparing to issues charters to branch organizaing to issues charters to branch organizations in every city in the State of Washington and in Alaska, and through the commercial organizations of the Northwest and Alaska have started a petition for 100,000 names to send to Second Assistant Postmaster General Praeger, in charge Aerial Mail Service, Washington, D. C., for Aerial Mail Service to Alaska. We also have undertaken to record the flying service of every fiver in the North-

flying service of every flyer in the Northand have a committee at work with the idea of ultimately securing training planes for the organization of a Reserve Squadron in Seattle for possible national

emergency.



THE DE HAVILAND OR AIRCO 17

18 Seater Twin Engine Tractor Biplane, designed by Aircraft Manufacturing Co., Ltd., London, for high speed passenger or goods transit. This machine has a spacious salon with gangway between seats and is lofty enough to allow passengers to walk about

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aeral Mail Servce
Louis T. Bussler, Chief of Maintenanice and Equipment
J. Clark Edgerton, Chief of Flying

John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
John A. Willoughby, Operator in Charge Radio Experiments
gene Sibley, Operator in Charge Radio Maintenance and
Operation Eugene



PILOTS

John M, Miller Lawton V. Smith E. Hamilton Lee Leater F. Bishop Walter J. Smith Harold T. Lewis Walter H. Stevens Herbert M. Crader

Charles I, Stanton, Superintendent, Eastern Division George O. Noville, Superintendent, Western Division Charles W. Fremming, Manager, Belmont Park Randolph G. Page, Manager, Bustleton Eugene W. Majors, Manager, College Park William J. McCandless, Manager, Cleveland Warren E. La Follette, Manager, Chicago Herbert Blakeslee, Manager, Beliefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton
Robert H. Ellis
James H. Knight
Elmer G. Leonbardt
Paul S. Oakes
Paul W. Smith
Frederick A. Robinson
Max Miller
F. A. Nutter

#### House Refuses Funds for Aerial Mail

Washington.—The largest Post Office Appropriation bill ever presented, carrying \$460,077,868 for maintenance during ing \$460,077,868 for maintenance during 1921; was passed January 15 by the House. The original estimate was \$391,713,673, but the House added \$75,783,900 for increases in salaries provided for in previous legislation.

An item of \$850,000 for continuing the existing aerial mail service beyond July 1 next was stricken out. The abandonment of the existing routes between New York and Washington and New York and Chicago, would result, it was said, if the Senate concurred.

The item went out on a point of order made by Representative Tincher, Republican, Kansas, as unwarranted by law. Representative Walsh, Republican, Massachusetts, presiding, ruled that the Post Office Department was not authorized by law to establish the aerial mail as a permanent service. An effort to restore the provision in the Senate is expected.

#### Open Chicago-Omaha Aero Mail Line

Chicago-Aerial mail service between Chicago and Omaha was inaugurated on Jan. 8 when Pilot Walter J. Smith left Grant Park carrying 400 pounds of mail and a package of meat.

#### Eight Hour Aerial Mail to Chicago

Regular eight hour service to Chicago by large two-motored mail planes capable of carrying 1,500 pounds of mail was in-augurated January 14, according to an an-nouncement by Postmaster Patten.

Heretofore mail has been carried by smaller ships of the single motor type. The big ships have the advantage not only of carrying a much larger quantity of mail but of being able to fly on even if one motor stops running. Mail planes now leave the Newark flying field at 6:30 a. m., arrive at Cleveland at 11:30 a. m. and at Chicago at 2:30 p. m. Eastbound and at Chicago at 2:30 p. m. Eastbound mail leaves Chicago at 6 a. m. and is in the New York post office at 5 p. m. Trips are made daily except Monday.



#### Pilot James H. Knight

Pilot James H. Knight, whose photograph we reproduce this week, has been flying for the Aerial Mail Service since June, 1917, and has never had a forced landing or failed to complete a trip in any kind of weather. He has established three consecutive records on the Cleveland-Buffalo route, 89, 86 and 83 minutes for the 215-mile trip. He also established a record from Cleveland to Chicago last August, 330 miles in 150 minutes.

#### New Field for Aerial Mail in Chicago

The Aerial Mail Service has contracted for the use of the Checkerboard flying field in Forest Park as a Chicago terminal, and will move from the present land-ing field in Grant Park as soon as build-ing construction is finished at the new field.

The new landing ground is considered more suitable than Grant Park for the large Martin planes which are to be placed in operation on the New York-Chicago route, and is so located that planes will be within reach of emergency landing fields at all times while flying in and out of the city.

An 80 by 100-foot hangar is being built

to accommodate the big Martins at the Checkerboard field and will be ready for use when these planes will make their initial flight from New York to Chicago.

#### Personal Par

Major W. H. Ewen, formerly of the British Air Service at headquarters in London, is in America on a business trip. He is now connected with William Cole & Sons, coach builders and manufac-turers. Major Ewen was an air pilot and was one of the first to take up flying in England.

#### S. A. E. Members Visit Goodyear

More than 200 members of the Detroit and Cleveland sections of the Society of Automotive Engineers held a splendid two-day session at Akron, Ohio, on December 1 and 2, as the guests of The Goodyear Tire & Rubber Company. The meeting was held for the purpose of presenting technical information pertaining to the application of pneumatic tires to motor trucks, the Goodyear experts having obtained much data in the company's development of trucks and truck tires. Monday evening the engineers were guests at a banquet at which F. A. Seiberling, president of the company, declared that within three years the solid tire would be obsolete and that the pneumatic cord was the ultimate tire. He asserted that in a few years there would not be a highway in the country of less than 18 foot width and the highways would be of solid foundation to counteract wear and speed by motor trucks. He also prophesied that China would be a great market for trucks.

On the last day of the convention, J. E. Shipper, George W. Breeze, H. W. Hancock and N. S. Reed were selected by lottery from the 200 delegates to make a balloon flight with Ralph H. Upson, the Conductor appropriate agriculture of the Conductor appropriate appropriate of the Conductor appropriate of the Conductor appropriate of the Conductor appropriate of the Conductor appropriate appropriate of the Conductor appropriate of the Conductor appropr the Goodyear aeronautical engineer. The big gas bag traveled 15 miles in 45 minutes, going to 6,000 feet altitude. As the flight was made in a snow storm, Pilot Upson says the aeronauts saw one of the most wonderful sunsets he has ever witnessed in years of ballooning in many countries. It was caused by sunlight on snow clouds.

# GENERAL ANALYSIS OF AEROPLANE RADIATOR PROBLEMS\*

By H. C. DICKINSON, W. S. JAMES and R. V. KLEINSCHMIDT

The objects of this report are (1) to present the analysis of the problem on which the experimental work conducted at the Bureau of Standards is based, (2) to explain the technical terms used in the work, and (3) to show the relations between the various parts of the work which are dealt with in detail in other reports.

The function of a radiator is to dissipate heat, but while doing so, it will have certain adverse effects on the plane on which it is mounted. First, it will add to the weight; second, the conditions for obtaining the best transfer of heat from the metal surface to the air require that the air shall flow rapidly past the surface, and this condition causes head resistance; third, certain positions of mounting on the plane seriously obstruct the view of the pilot or observer. A fourth factor of special importance in military aeroplanes is vulnerability and liability to injury, either from accident or from enemy bullets. The last two factors, not being capable of measurement, have not been considered in this investigation.

#### Statement of the Problem

The problem of design therefore becomes one of determining the type of structure, and the location on the plane, that shall give the radiator the cooling capacity required for the engine with which it is to be used, and at the same time shall result in a minimum adverse effect on the plane. The adverse effects due to weight and head resistance will be represented by the power absorbed in lifting and sustaining the weight and in overcoming the head resistance, and the fundamental criterion for an aeroplane radiator will be that its absorption of power shall be low, when it is of such size as to dissipate the required amount of heat.

It is necessary to state with some care what is meant by "power absorbed chargeable to the radiator." If it were possible to build and operate a plane without any radiator (or other construction to perform its function), a certain amount of power would be required to drive the plane through the air at a given speed. But the addition of the radiator may necessitate alterations in structure (such as the substitution of a flat-nose radiator for a stream-line nose or the enlargement of the fuselage in order to accommodate the radiator required), which will make the resistance of the plane greater than in the former case; and the radiator itself will add to the weight of the plane and will offer resistance to passage through the air. The difference between the power required to drive the plane as equipped with the radiator and that required to drive it at the same speed when designed without a radiator is the power absorbed chargeable to the radiator. It includes power absorbed due to (1) weight of the radiator; (2) pressure difference producing flow of air through the radiator (i.e., the head resistance of the core); (3) any increase in the resistance of the fuselage or other parts of the plane caused by changes in the structure necessitated by the radiator; (4) pressure necessary to produce water flow through the radiator. Items (2) and (3) together constitute the head resistance chargeable to the radiator, as distinguished from the head resistance of the core. In the case of a nose radiator there is not only a change in the condition of air flow due to the air which passes into the fuselage and out through the louvres, but also a change in form of the fuselage, due to the flat (and sometimes enlarged) nose required to accommodate the radiator.

#### Three Methods of Attack

There are three ways in which the problem may be attacked, namely:

1. A study of complete radiators on planes.

2. A study of types of radiator core and the methods of generalizing results to obtain the properties of complete radiators.

3. A study of the properties of single tubes, cells, or plates.

The first of these has been the basis of cut-and-try methods of determining whether a radiator will cool or not, but it has not been possible to consider the adverse effect on the plane by this method, except roughly. Weight is the only factor that can easily be measured, and it is found that in determining the power absorbed, weight may be of but small importance in comparison with head resistance. Although it might

be possible to work out a method whereby complete data could be obtained from tests in flight, the expense and difficulty of making the necessary large number of tests on planes is so great that a simpler method has been chosen, which will allow a large number of types of core to be tested under widely varying conditions of use.

The study of types of core has therefore been selected as the basis of the experimental work, to be supplemented by such work on complete radiators in planes as may be required to verify the conclusions reached, and furnish needed data on the effect of location on performance. It has also been found advisable further to simplify certain portions of the work by studies on single tubes and plates.

The object of a laboratory study of types of core is to determine:

- 1. The structural characteristics of the core which determine its performance in any particular case, and the effect of these characteristics on performance.
- 2. The properties, or behavior, of the core when subjected to various conditions of use.
- 3. The conditions under which the core will operate when it is a portion of a radiator in any particular location on a plane.

#### Structural Characteristics of a Core

The characteristics of a core which determine its behavior under given conditions of use have been taken to be:

- 1. Form and dimensions of air and water passages.
- 2. Depth of the core (measured in the direction of the air flow).
- 3. Kind and thickness of metal.
- 4. The portion of the frontal area which is open to allow the passage of air through the core, called "free area of the air tubes."
  - 5. Extent and nature of cooling surface.

As an example of the way in which these factors influence the performance of the core, the following may be noted As the depth of a core is increased the effectiveness of the cooling surface decreases owing to the rise in the temperature of the air as it passes through the air tubes, and the consequent decrease in temperature difference between the surface and the air. At the same time the amount of air that will flow through a tube decreases as the depth increases, tending further to reduce the cooling per unit surface. On the othe hand, the total amount of cooling surface per unit of fronta area is increased, and at a much smaller cost in head resistance than would be the case if the frontal area were increased Many of the effects of structural characteristics are governow by well-established laws so that a mathematical theory can be developed to predict their magnitude.

#### Properties Expressing the Behavior of a Core

The properties of a core which express its performance arthe following:

- 1. Energy dissipated (heat transfer or cooling capacity).— Since heat may be expressed in units of work, the rate of dissipation of heat may be expressed in units of power. I has been expressed in horsepower per square foot of fronta area, at any given air speed, for the conditions of turbulen water flow and a temperature difference of 100° F. between the water and air, as defined below.
- 2. Weight of the core, and of the water contained, are important properties, being directly involved in the computation of horsepower absorbed.
- 3. Head resistance of the core, the force required to pus it through the air, must be distinguished from head resistanc chargeable to the radiator (defined above), which is the par of the over-all resistance of the plane caused by the radiato and any modifications of structure that the radiator may mak necessary.
- 4. Mass flow constant.—It is found for all ordinary type of core that, when supported in a free air stream, the amour of air that passes through the core is proportional to the fre air speed (at constant density), and therefore is proportions to the mass of air that would pass through the area occupie

<sup>\*</sup>Report number 59 National Advisory Committee for Aeronautics.

by the core if the core were removed. The fractional part of the air approaching the core, which actually passes through its air tubes, has been called the mass flow constant of the core. It is an important property, since the heat transfer and the head resistance are both closely related to it.

5. The power absorbed by a core may be computed from the head resistance and the weight as follows:

(a) If the total weight and the total available power (at the propeller) are known for the plane, the power absorbed by the weight of the core can be found approximately, and to this must be added the power required to overcome the head resistance, the latter being obtained directly from the head resistance and the speed of the plane.

(b) If the lift-drift ratio of the plane is known, it is simpler to divide the weight by this ratio, and thus reduce it to equivalent head resistance; i. e., drag on the wings and structure required to carry the weight, and to add this to the head resistance before multiplying by the plane speed to obtain the power absorbed.

In either case, it should be borne in mind that the power so computed is not necessarily equal to the power chargeable to the radiator, but is subject to the same limitations as the head resistance, as noted above. This method, which is intended to give a basis for comparison between cores, gives only an approximation. The British have shown by a very careful analysis the effect on a plane of small additions of weight and resistance, and it is shown that their relative importance varies greatly, according as top speed or ratio of climb is given greater weight. This, of course, is due to the change in lift-drift ratio under various conditions.

Figure of merit.—In order to obtain a quantity by means of which the performance of various cores can easily be compared, it is necessary to consider both the energy dissipated and the power absorbed. The rate at which a radiator dissi-pates heat per unit power absorbed is a measure of the suitability of the radiator for aeroplanes use so far as these two factors are concerned. This quantity has been called the figure of merit. The figure of merit will be the criterion for a radiator in any position, provided the power absorbed is the total power absorbed chargeable to the radiator as defined Unfortunately it is necessary to limit the definitions of head resistance of a core and power absorbed by a core to very specific conditions of use which can be accurately reproduced in the laboratory, so that it is only when the air flow around the radiator is not obstructed by other parts of the plane that the figure of merit of a core is of value in determining the figure of merit of a radiator.

#### Condition of Use

The conditions of use which affect the performance of the rdiator, have been chosen not only to give the most accurate description of the factors which really determine the properties, but also to allow of easy comparison with the conditions found in flight. They are the following:

1. The mass flow of air through the core. This is defined as the mass of air that flows per second through the air tubes of a section of core of one square foot frontal area. This use of the term "mass flow" is identical with the common use of the term in the works of Osborne Reynolds and others, if the radiator is regarded as a structure through which air flows, and no account is taken of the fact that the flow is made up a flow thorugh a number of small tubes.

A careful distinction is made between the velocity of the A careful distinction is made between the velocity of the air approaching the radiator (free air speed) and the mass flow through the core. It is the latter quantity that determines the effect of air velocity on heat transfer. It should be noted that the flow of air through the core depends upon many factors besides the free air speed.

2. Temperature difference between air and water. Strictly speaking, the heat transfer is determined by the mean over the entire core, of the temperature difference between the air.

the entire core, of the temperature difference between the air and the water, at each small element of cooling surface. It can be shown, however, that for a given radiator under constant conditions of air flow and water flow, except that the air and water temperatures vary, the heat transfer is very nearly proportional to the difference between the mean term continue of the water and the temperature of the entering air. nearly proportional to the difference between the mean temperature of the water and the temperature of the entering are. The water temperature depends, however, on the total length of the core, as well as upon the rate of flow through the core, so that it is much simpler to use the mean water temperature. The logarithmic mean should theoretically be used, but as the arithmetric mean differs from it very slightly under ordinary conditions of use it has been employed to save labor. The temperature difference under which a core works is given temperature difference under which a core works is given, then, as the difference between the temperature of the entering air and the mean of the temperatures of the entering and leaving water.

3. Air density.—Results have been reduced to a "standard"

per cc; approximately density of dry air at 20° C., 78° F.).

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4. Flow of water may be expressed in two ways, in quantity units, and in linear velocity through the tubes. The quantity of water flowing affects the drop in temperature of the water in passing through the radiator, while the linear velocity determines to some extent the rate of heat transfer.

5. The mechanical condition of the air and water in the tubes of the core is of considerable importance in determining its performance. If there is turbulent flow, the heat transfer will be by convection and can be much more rapid than in the case of streamline flow. On the other hand it is necessary to impart considerable energy to a fluid in order to produce turbulence, and this means an increased absorption of power by the radiator.

#### Generalization of the Properties of a Core to Obtain Those of a Complete Radiator

In considering the relations between the conditions under which a section of core operates when in a complete radiator, and the test conditions used in the laboratory, there are seen to be two general classes of locations in which a radiator may be placed on a plane. When the air flow around and through the radiator is not affected by the surrounding portions of the plane, the radiator is said to be in an unobstructed position. In this case there is no reciprocal effect of the radiator on the other parts of the plane, and the properties of a radiator in such a position may be computed from the results of labora-

When the air flow through the radiator is affected by other parts of the plane, it is said to be in an obstructed position. Such a radiator has a marked effect on the properties of surrounding portions of the plane, and the effects chargeable to it are not related in a simple manner to the

and the effects chargeable to it are not related in a simple manner to the properties of its core.

In order to obtain the properties of a radiator when in place from the properties of the core as determined by laboratory tests, it is necessary to know (1) the conditions of use of each part of the core, i. e., air flow, water flow, and temperatures: (2) the effect of headers, piping, etc.; and (3) the reciprocal effect of the radiator (especially the air flow through it) on other parts of the plane.

#### Air Flow Through the Radiator

The mass flow of air through a radiator in an unobstructed position may be obtained directly from the mass flow constant of the core, the free air speed to which the core is subjected, and the air density. The free-air speed will usually be the plane speed, augmented by any effect of the propeller-slip stream. For a radiator in an obstructed position, the mass flow of air can not easily be computed. It is hoped to make measurements of this mass flow in obstructed positions in a series of tests in flight.

Temperature Difference

As noted above, the temperature difference selected for expressing the energy dissipated was so chosen that the results can be applied at once to a radiator of any size by using the mean temperature of the water. The latter may be found from the entering temperature, the amount of heat to be dissipated, and the water flow. It is therefore possible to regard an entire radiator as having a mean temperature, and as the air entering all parts of the radiator will commonly have the same temperature, the mean temperature difference for the radiator is easily found.

#### Flow of Water

The linear velocity of the water in the tubes determines the turbulent condition of the flow and should be kept above a certain value for each type of core. The total quantity of water flowing per unit time determines the temperature drop in the water, and thus affects the temperature differences.

Energy Dissipated

The laboratory tests of a core will give the energy dissipated under "standard" conditions for a unit frontal area of core, and for any mass flow. If the mass flow is known, the total heat dissipated will be found from the test results and the frontal area of the core. Conversely, if the heat to be dissipated is known, the required frontal area of core can be determined. The amount of heat to be dissipated is a subject that will bear some study under actual flight conditions. In particular, the effect of the air that passes through a nose radiator, in cooling directly the walls of the engine jackets, should be determined, for it is an effect with which the radiator (or the position) should be credited.

#### Head Resistance

The head resistance of a radiator placed in an unobstructed position may be obtained directly from that of the core. It is roughly proportional to the frontal area, but includes the effect of headers and connections. For an unobstructed position, if the mass flow of air is known, the head resistance of the core will be the same as that given in an unobstructed position when at such a speed as gives the same mass flow But this value represents only that part of the total resistance chargeable to the radiator which is due to the pressure difference on its two faces. The resistance which other parts of the plane offer to the air which has passed through the radiator may be very considerable. Also if the front of the fuselage has to be enlarged in order to accommodate a larger nose radiator, this may cause a very great increase in the resistance of the fuselage, all of which is chargeable to the radiator. The resistance of obstructed radiators requires special study.

Power Absorbed

The power absorbed by an unobstructed radiator may be obtained from

The power absorbed by an unobstructed radiator may be obtained from that of the core as given by a laboratory test with corrections for headers and connections. Since, however, it depends upon the lift-drift ratio of the plane (it has been computed for a ratio of 5.4), a special computation using the actual lift-drift ratio of the plane will give a better value. The values given with the results of tests are intended chiefly for comparative purposes. In obstructed positions the power absorbed must be specially determined.

Figure of Merit

The figure of merit of a radiator in an unobstructed position will for comparative purposes be equal to that of the core. For obstructed positions it must be specially computed. It will always be less than that of the same radiator in an unobstructed position with the same mass flow

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# LAWS C

THERE HAS
NEVER BEEN
A PERSON
HURT IN A
LAWSON
AIRPLANE



HERE IS A FACT — AN ACTUAL PHOTOGRALAWSON AIRLINER PASSING OVER NEW YORTRIP FROM MILWAUKEE TO WASHINGTON

LAWSON AIRLINE COMPANY





FACTS
ARE
BETTER
THAN

FANCIES

F THE GREAT <u>26</u> PASSENGER CARRYING RBOR ON ITS 2500 MILE HISTORY MAKING RETURN.

MILWAUKEE, WISCONSIN, U. S. A.

#### THE SUPERMARINE FLYING BOATS

#### The Supermarine A. D. Type Boat

This machine was designed for sea patrol and reconnaissance work, and was a tandem two-seater, with a gunner-observer in the bow of the hull with the pilot behind.

The hull was of the type associated with the name of Major Linton Hope, in that it was built up on a framework of approximately circular sections, composed of a number of fairly light longitudinal members tied together by very light and flexible rings of elm. This main skeleton is completely planked over with thin mahogany, and forms a tubular body which is extremely stiff against either bending or torsion.

At the same time it is not a rigid structure, in that all the ring elements of which it is built are flexible and capable of distortion into an oval section without damage—a quality which acts as a very effective springing against "taxying" and alighting shocks.

Projecting fins which form the planing surfaces, also built on a framework of flexible timberings, are built onto the main tubular body to complete the hull. In practice this type of hull has given extremely good results on the water, and stands up well to the very worst weather.

The wing structure is of the usual biplane type, with a large overhang braced above from a pylon. The upper center section is carried from four vertical struts, with a separate structure supporting engine and radiator between them.

The wings are arranged to hold forward, hinging on the front spar, an arrangement which adds somewhat to the overall length folded. Folding to the rear in the ordinary way would have meant a longer hull to carry the tail clear of the wing bracing, with a considerably increased hull weight and an impaired maneuverability.

The power plant consisted of a 200 h.p. Hispano-Suiza engine, a type of engine which never gave great satisfaction in these machines on account of continual trouble with the reduction gear and the propeller

The tail unit was a biplane, with twin fixed fins enclosing the intertail struts, each having a rudder. The tail is curious in that the upper and lower surfaces were of wing profile in section, but the upper was inverted—i. e., was concave upwards—whilst the under surface was in the usual position. The upper inverted surface working in the slipstream carried a heavy down load when the engine was running, and supplied a moment balancing that caused by the

The machine was fitted with tanks for four and a half hours full-power flight, Lewis gun and ammunition and wireless.

With this load the machine gave an excellent all-round performance with a top speed in the neighborhood of 85 knots.



The Supermarine "Baby"

Machines of exactly similar type, fitted with 160 h.p. Beard-more engines and with increased passenger accommodation, are being used with great success by the Supermarine firm for their South Coast passenger services. No detailed specification of this type is available.

#### The Supermarine "Baby"

This was a small single-seater fighter boat designed upon lines somewhat similar to those of the previously described two-seater.

#### Specification.

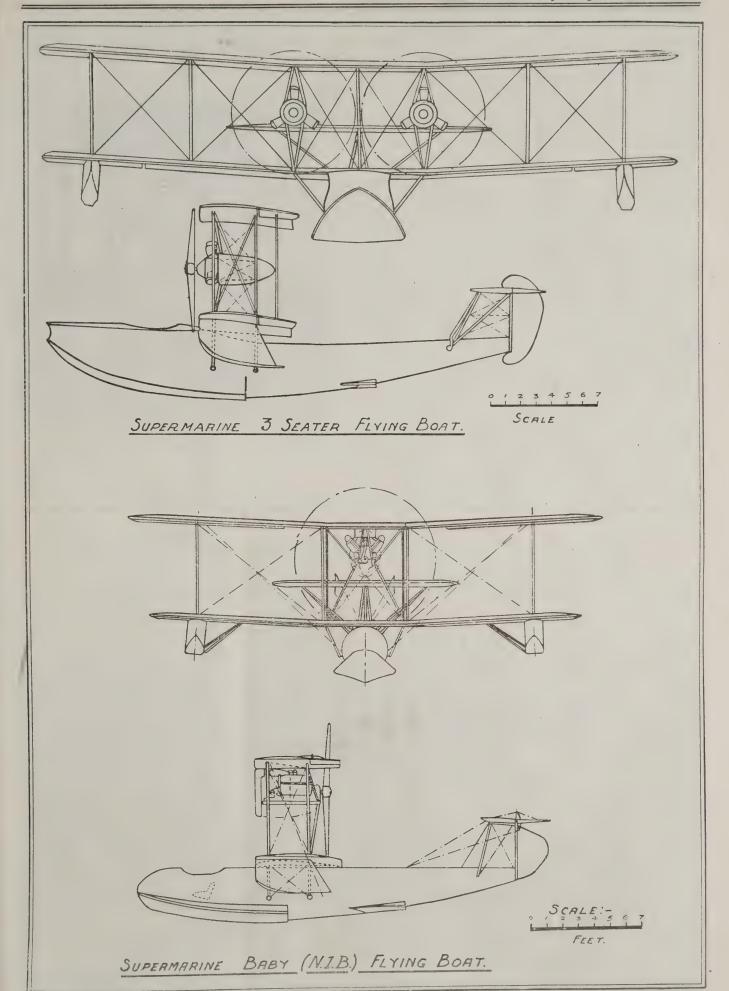
Type of machine.......Single-seater Flying-boat
Name of machine.....Supermarine "Baby"
Purpose for which intended...Single-seater Seaplane Fighter

Span ....

Overall length 26.3 ft.
Maximum height 10.6 ft.
Chord 5.5 ft.
Total surface of wings309 sq. ft.
Engine type and h.p
Hispano-Suiza 150 h.p.
Weight of machine, empty1,699 lbs.
Load per sq. ft
Weight per h.p 15.5 lbs.
Tank capacity in hours 3 hrs.
Performance—
Speed low down
Landing speed 57 m.p.h.
Disposable load apart from fuel 627 lbs.
Total weight of machine loaded2,326 lbs.



Side view Supermarine A. D. Type, with Hispano-Suiza engine



In addition to these machines the firm has the following designs in hand:

Type A. Small single-seater high-performance machine designed for a speed of 130 m.p.h. and a climb to 10,000 feet in eight minutes. The attached scale drawing shows that this machine is in general arrangement very like the machine which, fitted with a 450 h.p. Napier engine, was entered for the Schneider Cup Race.

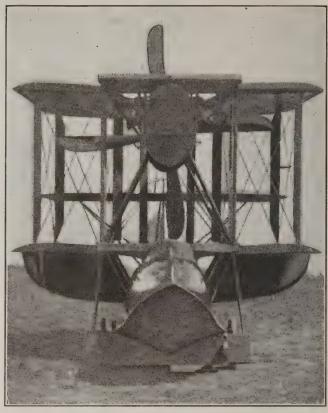
Type B. A twin-engined training flying-boat, shown in a scale drawing. The machine is fitted with dual control in two side-by-side seats, with an additional seat for passenger. Two 100 h.p. three cylinder Cosmos "Lucifer" engines form the power plant, which should give a maximum speed of 90 m.p.h. With minor modifications this type becomes a three-seater sporting model.

Type C. A small passenger or mail flying-boat for one pilot and three passengers or their equivalent. To be fitted with a Beardmore engine of 160 h.p.

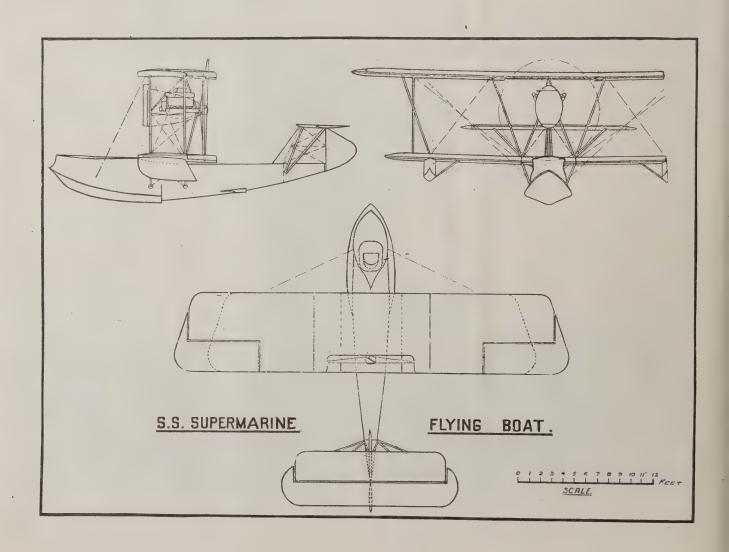
Type D. A long-distance passenger, mail and commercial flying-boat of the triplane variety, to be fitted with three Cosmos "Jupiter" engines of 500 h.p. each. Accommodation is to be provided for navigator, two pilots and twenty-four passengers or  $1\frac{1}{2}$  tons of mail or goods. A speed of 98 m.p.h. and a radius of 4 hours at that speed are hoped for.

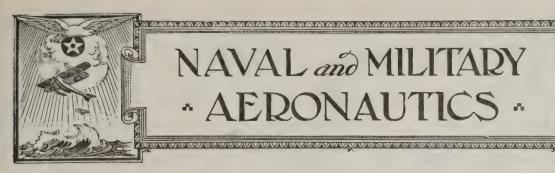
Mr. Hubert Scott Paine, the managing director of the Supermarine Company, is firmly convinced of the practical utility of the boat type of seaplane, both for naval and for commercial purposes.

It may therefore be expected that Supermarine developments of the future will be at least as interesting as those of the past.

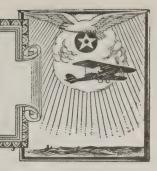


Front view of the Supermarine "Baby" folded





# NAVAL and MILITARY · AERONAUTICS ·



School for West Point Candidates Opens at Kelly Field

The Commanding General of the Southern Department has requested that a school be opened at Kelly Field for the instruction of enlisted candidates who desire to take the entrance examination for sire to take the entrance examination for the West Point Military Academy. The course of instruction has been placed under the supervision of officers who are West Point graduates. It has been an extremely difficult matter to organize a school at this time, due to the fact that there are but few officers in the Air Ser-vice who are West Point graduates; but nevertheless a school has been actually nevertheless a school has been actually started and at the present time is in-structing candidates for this examination. Twenty-six enlisted men from the Southern Department, of which 15 are from the Air Service units, are to attend this

#### Kelly Field Organizes Polo Team

Providing all works well, the indications are that the Commanding Officer at Kelly Field will have a well organized Polo team in a very short time. Recently the Adjutant General of the Army advised by circular that military posts would be furnished with Polo equipment, ponies, etc., upon application to his department.

Major Garrison of Kelly Field, an expert Polo player and a member of the "Free Booters" of Fort Sam Houston, Texas, has organized the Polo Team.

Many of the flying officers have never

many of the hymig officers have never-ing spurs just the same, nor have they had an opportunity to play this interest-ing and exciting game, and while waiting for the ponies to arrive the embryo polo

candidates are practicing on dummy horses and with driving nets.

The polo team candidates are as fol-The polo team candidates are as follows: Lt. Col. Johnson, Major Garrison, Major Stratemeyer, Major Cousins, Major Schauffler, Captain Bissell, Captain Adler, Captain Buckley, Captain Tyndall, Captain Cook, First Lt. Van Meter, First Lt. Metley, First Lieut. Blackburn, First Lieut. Easterbrook, Second Lieut. Wolfe, Second Lieut. Gates, Second Lieut. Wood, Second Lieut. Eller, Second Lieut. Morton, Second Lieut. Second Lieut. Morton, Second Lieut. Zellner, Second Lieut. Brophy, Second Lieut. Rowland, Second Lieut. Beez, Second Lieut. Mosher, Second Lieut. Smith. It is to be hoped that the officers who

are practicing for accuracy and efficiency will have respect for each other's heads and shins as well as those of the ponies. A number of games with military civilian polo organizations are already assured, and when the civilians see aviators upon horses they will realize that the aviators can use a pair of spurs for something else other than to push the rudder bar of an aeroplane or get them tangled up in the controls.

#### Standardization of Insignia, Etc.

The Specifications and Standards Section of this Division is making an effort to standardize colors for insignia, markings and coating of aircraft. It is expected that samples of these colors will soon be ready for distribution, thereby settling a matter about which there has been much question of late. This Section also has under consideration the matter of deciding on colors for shock absorber cords in order that one year's manufac-ture may be distinguished from another. Air Route from Mineola to Alaska Charted in Flight

Washington, D. C.—An air route from Mineola, N. Y., to Nome, Alaska, a distance of 4,871 miles, has been plotted by the Army Air Service, with a view to a flight over this course at some time in

the future.

The proposed route crosses the Canadian border at Minot, N. D. At Hazleton, B. C., the route turns north between the coast range and the Rockies to White Horse, Yukon Territory, and crosses the Alaskan border at Fort Egbert and thence to Nome.

The course selected, the War Department asserted, leads through the most populous section, affords supplies and telegraphic communication and is less likely to be covered with fog.

#### Planes Fly to Guantanamo

On Board the U.S. S. Pennsylvania.-A group of sea planes, under command of Lieutenant Commander B. G. Leighton of the Atlantic Fleet, arrived at Guantanamo from Key West, to take part in the winter maneuvers of the Atlantic Fleet in West Indian waters. The U.S. S. Shawmutt, mother ship of the aviation detachment commanded by Ca George Steel, entered Guantanamo Captain two hours before the aerial squadron.

#### Personal Par

W. L. Perley, late lieutenant in the Bureau of Aircraft Production, has been made assistant to President C. S. Rieman, of the Elgin Motor Car Corp., Argo, Ill. Perley was for two years assistant to the director of engine production in this bureau.



Three squadrons of "Bristol Fighters," Royal Air Force, under inspection at Spiel near Cologne, with the English Army of Occupation in Germany



#### FOREIGN NEWS



#### Handley-Page Passenger and Freight Record

A summary dealing with the actual experiences of running a fleet of large aeroplanes for commercial and passenger-carrying purposes has been produced by the Handley-Page Transport, Ltd. It deals with the London, Paris and Brussels daily air services, and shorter journeys in the United Kingdom. The machines used are the famous twinengined Handley-Page aeroplanes, which for three years carried out heavy night bombing over enemy territory. The record since May 1st is as follows:

#### The Late Sir John Alcock

The Late Sir John Alcock

Rouen.—Captain Sir John Alcock, the first aviator to make a nonstop aeroplane flight across the Atlantic, died here as a result of injuries he received when his plane crashed near Cottevrard, Department
of Seine-Inferieure, Normandy.

Captain Alcock, who was flying in a water plane, was following the
Seine at the time of the accident, intending to alight on the river
opposite the Grand Palace for an aviation exhibition. Flying low,
owing to a heavy fog, Alcock was unable to sight the earth. He struck
the ground near Cottevrard. A wing of the plane was smashed and
the machine turned over, pinning Alcock under the wreckage. The
aviator suffered a fractured skull and a local doctor gave him first aid.
Alcock was then taken to the British military hospital here, where he
died without recovering consciousness.

#### Gen. Sykes's Visit to America

No fresh date has yet been fixed for the postponed visit to the United States of Major General Sir Frederick Sykes, Controller-General of Civil Aviation. It is understood that the postponement of the visit is the direct outcome of General Seely's resignation, General Sykes remaining in London at the request of Mr. Churchill, it being considered undesirable that he should be abroad while the appointment vacated by General Seely is unfilled.

#### French Guiana Air Service

Paris.—A regular aeroplane service has been established in French Guiana, not only for passengers, but for taking out merchandise and bringing back gold to the headquarters of the service in Cayenne. The venture was started by private enterprise and is aided by the Govern-

ment.

The service was organized by Captain Dutertre of the navy and covers a route of approximately 150 miles. The first plane arrived at Cayenne on October 12 and received an enthusiastic welcome from the populace, which covered the machine with flowers.

Wants Air Primacy to Remain French
Paris.—World co-ordination in the development of aviation, both military and commercial, is advocated by Stéphane Lauzanne in a leading article in Le Matin. He recommends that experts be attached to embassies in the allied capitals, so that each nation may have the benefit of the progress of the others. He calls on the Government of France to maintain for France in peace the position in aviation she gained in war.

to maintain for France in peace the position in aviation she gained in war.

"On the day of the armistice," he says, "the aerial fleet of France comprised 30,000 aeroplanes and 60,000 aerial motors. This was the magnificent result of a gigantic effort. It was French mastery in the air. Today, after a year of peace, the question arises whether or not we are going to let this effort die; whether we are going to let our mastery slip away.

"The aeroplane is not only an engine of war; it is an agency of commerce, of the postal service and of surveillance. We must not forget that we have a colonial empire which ranks second in the world. Let us see, then, what there is to be done.

"First, we should have a technical section of aviation. We now have such a section, well equipped so far as men are concerned, but miserably equipped in material. It has survived, thanks to the energy of its chief and to the daily battles he has fought in the Government bureau."

After making technical recommendations and reviewing recent progress, M. Lauzanne says: "What will our experts not be able to accomplish when they are properly equipped to study, to experiment and to work?

"Second, we should have a central organization of aerial navigation which charted in the contents of the study of the property of the pr

work?
"Second, we should have a central organization of aerial navigation which should include France and our principal colonies in Northern Africa. This organization should have its landing fields, its hangars, its workshops, and its engine dépots, just as railroads have their stations, and ships have their ports. What economy of effort and of money

would not be effected by squadrons navigating France and Morocco and policing the Soudan?

"Third, we should teach aviation to our future officers. Nothing is perhaps more symbolic of the state of French aviation than that today there is no school of aviation at St. Cyr. We teach in our military schools the tactics of cavalry, but we do not teach the tactics of aviation. They talk about war there, but they do not talk of the part aviation plays in war. Also, we have a Minister of National Defense, with a formidable budget, four or five under-secretaries, and seven or eight general directors; and in all this array there is no one who talks of the aviation of tomorrow.

"Fourth, we should have aviation attachés abroad. If Paris no longer interests itself in aviation, London, Washington, and Rome will interest themselves, and Berlin tomorrow more than ever. Just as we have military and naval attachés, we ought to have aviation attachés who would maintain liaison with our allies, who would watch the aviation programs of our enemies, who would observe the scientific progress of all. Not only military but commercial aviation will gain by knowing what I line to Germany.

New Air Line to Germany

Another air route to the Continent will be in operation very soon, for plans are now under way to provide transit by aeroplane for passengers and mails from Denmark to Germany. According to a report from Trade Commissioner Thormod O. Klath, at Copenhagen, two Danish aeroplane companies have made applications to the Danish Government for permission to establish a regular passenger and mail service by aeroplane between Copenhagen and Warnemunde, Germany. It is understood that a German company plans to establish an air route between Warnemunde and Berlin as soon as the Danish air service between Copenhagen and Warnemunde is in operation, with a view to co-operating with the Danish companies and thus afford means of direct aeroplane transit service between Copenhagen and Berlin. The shortest and most used passenger route from Copenhagen to Berlin is by way of train to Gjedser, Denmark, thence by ferry to Warnemunde, and then by rail to Berlin. At present practically all of the Scandinavian and Baltic passenger and mail traffic is carried over this line, and for the last few months all trains have been crowded and the service has been very unsatisfactory. It is expected that the new aeroplane service will prove very popular with business men going to and from Germany, because of the great congestion in railway travel to points in Germany and the very unsatisfactory facilities provided by the German railroads.

#### Imports by Air

An interesting sign of the times is to be found in the London customs bill of entry, which now contains in its imports columns details concerning goods brought into Great Britain by air.

A recent issue announces the fact that the Handley Page Transport Co., Ltd., have imported from France quantities of silk, fancy goods, ladies' hats and embroidery.

These commodities were carried from Paris to Hounslow by the two engined Handley Page aeroplanes engaged on the cross channel service.

#### The Chinese Government

With a view to developing commercial aviation, has entered into a contract with the Vickers organization of England for the supply of a large number of Vickers-Vimy commercial aeroplanes. To meet the cost of the purchase of machines, construction of aerodromes, repair depots, and administration, the Chinese Government is making an issue of approximately \$9,000,000 in treasury notes all of which sum is to be expended in the development of commercial aviation in that country.

#### Aeroplane Service for Peru

Lima.—Anouncement is made that the Handley-Page Aeroplane Company will in a short time start a commercial hydroaeroplane service along the Peruvian coast. A pilot and three mechanics have arrived here, and two aeroplanes in charge of a second pilot are expected to arrive within the coming fortnight.

#### Diplomas in Aeronautics

The Morning Post announces that an institution, which is hoped to make the principal authoritative body for the technique of British commercial aviation, came into existence on September 11th in London, when a small body of aeronautical engineers organized the Institute of Aeronautical Engineers. This institute proposes to issue diplomas in the various branches of the industry after competitive examinations. Five grades of membership are proposed: (1) Open to pilot designers, engine designers, air-screw designers, and designers of aircraft that have flown; (2) open to aircrafts designers and constructors of machines that need not necessarily have flown; (3) for pilots; (4) for learners; (5) allotted to honorary membership to which election will be made. Admission to the first three grades will be made by competitive examination.

#### Aerial Searchlights

The British Air Ministry announces that, as an emergency measure to assist belated aircraft to locate their aerodromes after dusk, it has been arranged for vertical searchlight beams to be projected from the official aerodromes from about dusk till all service machines have arrived. From Hounslow aerodrome there will be one beam, from Kenley two beams, and from Limpne three beams arranged in a triangle.

R-80 is Ready

The R-80, the new British rigid airship, is just about completed and will be handed over by her manufacturers. Vickers, Ltd., to the Admiralty. The R-80 embodies the latest improvements in British design. She is 535 feet long, has an overall height of 85 feet with a beam of 70 feet.

Her total lift will be 76,000 pounds, or 38 tons, and her four motors, each of 240 horsepower will give her a speed of over 65 miles per hour. A crew of fifteen or sixteen will be necessary to operate her.



# ELEMENTARY AERONAUTICS

#### and MODEL NOTES

By John F. McMahon

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#### British Models

Model aeroplanes of different countries vary in shape and general design much the same as the people of different countries vary in general appearance. British designed models are no exception to the rule, and when one sees a model made by a Britisher he does not mistake it for any other.

made by a Britisher he does not mistake it for any other. To illustrate the various models I will include in the discussions on this page general data and criticisms of British models as shown in F. J. Camm's book, "The Design of Model Aeroplanes." When a Britisher designs a model he does so with flying efficiency for his main object—the appearance of the plane is of secondary importance, so most of the fuse-lages are mere sticks, wings are square edged and, to the American, the general contour of the machine is ugly. However, they fly well and for record-breaking distances. It will ever, they fly well and for record-breaking distances. It will be noticed that the elevator in the racing type plane is always

be noticed that the elevator in the racing type plane is always far up to the nose of the frame, and the propellers are generally bent from thin sheets of birch wood.

The first is the Ridley monoplane, which is of the well-known A frame type. This type leaves little to be desired by those who make model aeroplanes purely for the sport of flying them. It has been greatly popularized by Mr. R. F. Mann, Mr. C. R. Fairey and Mr. J. Ridley, and has successfully figured in many of the contests held at Hendon. It has, in expert hands, created some remarkable distance and duration records, the best of which, so far as I can recall, are 900 yards distance and 120 seconds duration. These records were, of course, established by different machines.

It is worthy of note, in passing, that the Kite and Model Aeroplane Association, the official body to observe and place on record the performances of models, held (and will hold, it is hoped, in the near future) meetings periodically to observe attempts to break existing records. No record, however well authenticated, can be accepted or recorded as official unless the performance is actually witnessed by an accredited member of this Association.

The longitudinal members of the A frame would be of the standard of the server well authenticated the sheareled added the sing placed inwardly.

The longitudinal members of the A frame would be of channeled section, the channeled edge being placed inwardly

Another well-known and successful type is the Twining monoplane, which is equipped with a chassis for rising from the ground under its own power. This machine, which is monopiane, which is equipped with a chassis for rising from the ground under its own power. This machine, which is an extremely pretty flyer, secured the Wakefield Gold Challenge Cup, which is competed for annually, and is awarded to the machine establishing the greatest duration. The model is capable of a flight of sixty seconds after rising from the

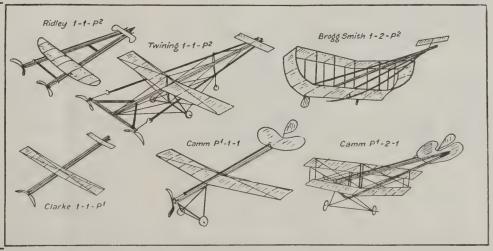
Mr. Twining has done much to popularize model aero-planing in this country, having been a prominent maker and competitor, whose machines were recognizable by soundness of construction and neatness of design, as well as a recognized writer on the subject.

The Bragg-Smith model biplane is the subject of a patent for automatic stability, and has secured many awards in open competition. Readers must note that they cannot make this machine for sale, owing to the patent law. This machine is a steady flyer, and is essentially designed for duration. It first came into prominence at a competition held at the Welsh Harp, Hendon, eight or nine years ago. As will be seen from the sketch, a protective skid runs underneath the entire length of the fuselage, being secured to the lower main plane by means of a small block, which is pinned through the main plane to the central interstruts. The original model was a single screw machine, but latterly Mr. Smith has developed the design into twin screw. the design into twin screw.

The simple monoplane shown to the left of the drawing is, with the exception that the surfaces were entirely of wood, instead of the fabric-covered planes I have shown in the drawing, a type with which Mr. T. W. K. Clarke's name will always be associated. These were also successful little flyers, which only weighed an ounce, and which the enthusiast could always carry in his pocket.

A model built on such lines could be made to fly quite as well from the point of view of distance or duration as the other types. Indeed, Mr. Trykle, of the Birmingham Club, once held the duration record (unofficial) with a model of this type.

Some English Models as described by F. J. Camm in his book on Model Aeroplanes





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### For Grave Offenders

Editors, I am told, are frequently and unnecessarily annoyed by correspondents who will not obey the simple rules laid down for those who write, or who wish to write, for the press. Perhaps these lines will be effectual where a more formal appeal might fail:

In the Molten Hotel, in the Sulphuric Glade, . Where the temperature's nine ninety-eight in the shade, There's a thrice-heated chamber, dug out with a scraper, For the fellow who writes on both sides of the paper.

Where the billows of brimstone delightfully roar, And the geysers their flaming red cataracts pour, There's a blistering bath in the cauldron of flame, For the chump who neglected to sign any name.

In Saltpetre Avenue, close to the Pit, Where the vitriol reservoirs splutter and spit, There's a bed on the griddle that never gets damp, Prepared for the chap who encloses no stamp.



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Editor's Note.—Feeling that a course of this kind would be of inestimable value to our readers, arrangements have been made to publish this course here. The first lesson follows:

#### Lesson I

#### Introduction, etc. (mostly etc.)

Necessity has always been the mother of invention and so with the aeroplane. Man had no way to get from place to place except by train, boat, auto, wagon, motorcycle, bicycle, riding, walking, swimming, or not going at all. To surmount this difficulty Langley invented and built the first "flying machine" before all others or shortly prior thereto if not soon before, at any rate it never flew till after the first one had flown, which clears the question for once and for everyone. The difference between the modern aeroplane and the first ones is that now most of them fly and then most of them didn't.

The war is what did most toward the development of the aeroplane because the aviators who fought over the front had nothing in the world to do except to fly around over the lines and watch the scrap and ponder on how to improve the aeroplane. A great deal of credit, of course, must be given to the men who were able to sit on this side of the water and develop fighting machines, bombers and scouts that were just the thing for the front. It was indeed a great war.

When the first aeroplanes were built it was found that they would not leave the ground, but this difficulty was later surmounted by moving the ground away. So have the obstacles been overcome until the aeroplane has reached its present state when mother birds can't tell their young from Kee-wee's.

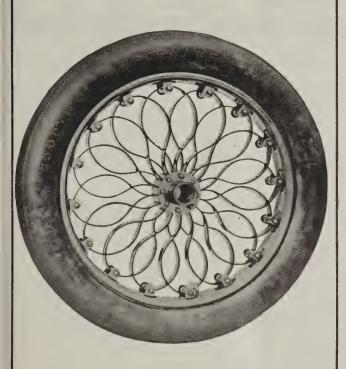
Now, as it will be necessary for our students to be able to tell an aeroplane from a bird, we recommend this infallible method. Follow the subject under inspection very closely and if you can stalk it sprinkle salt on its tail; then, having captured it, ask it to sing. If it sings it's a bird.

By the time the student has familiarized himself with the kinds, speeds, looks, habits, etc., of aeroplanes he will be able to continue with the next lesson to appear.

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Aero Club of America Calls for Airmen to Represent U. S. in Four International Aerial Contests. Aero Club of Texas Makes an Entry.

Aviation in Britain, by Major-General Sir F. H. Sykes, Controller General of Civic Aviation.

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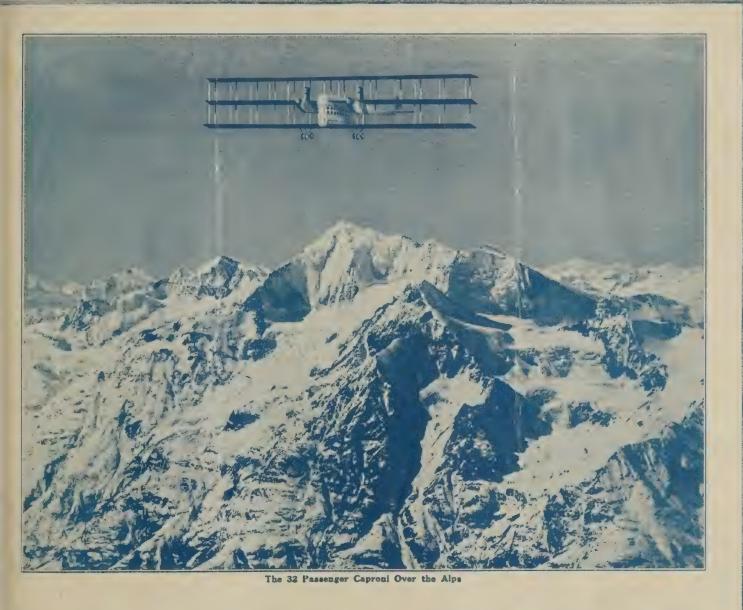
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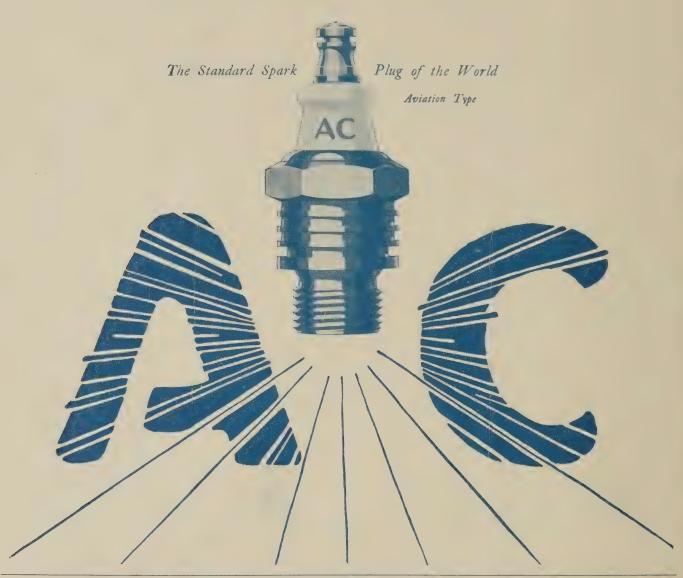
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Minneapolis Motors
Mitchell
Moline-Knight

Monroe
Moreland Trucks
Napoleon Trucks
Naph
National
Nelson
Nelson & Le Moon
Trucks
New Britain
Tractors
Netoo Trucks
New Britain
Tractors
Oakland
Old mobile
Oneida Trucks
Owens Light &
Power Plants
Packard
Palge
Pan
Parker Trucks Pan
Parker Trucks
Paterson
Patriot Trucks
Perfect Power
Sprayers
Phianna
Pierce-Arrow
Pilot
Pioneer Tractor Porter Premier Ranger Trucks

Red Wing
Thorobred Motors
Reo
Re Vere
Reynolds Trucks
Riker Trucks
Roamer
Roberts Motors
Robinson Fire
Trucks
Rock Falls
Rowe Trucks
Rutenber Motors
Samson Tractors
Sandow Trucks
Sanford Trucks
Sanford Trucks
Saver-Massey
Tractors (Canada)
Savon
Scripps-Booth
Scripps-Standard "8"
Standard Trucks
Standard Trucks
Standard Trucks
Standard Trucks
Standard Trucks Standard Trucks
Stanwood
Stearns-Knight
Stearns Tractors
Sterling Engines
Sterling Trucks
Stewart Trucks
Stockton Tractors
Stoughton Trucks
Straubel Engines

Red Wing Thorobred Motors

Sullivan Trucks
Super Trucks
Swartz Lighting
Plants
S-S-E-Co.
Tiffen Trucks
Trioga Tractors
Titan Trucks
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Tractors
Union Marine
Engines
Universal Trucks
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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., February 2, 1920

Subscription Price, \$4.00 a year. Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, FEBRUARY 2, 1920

NO. 16

# FOUR HUNDRED AERO CLUBS TO AID IN MAKING AERIAL DERBY AROUND THE WORLD AN ANNUAL EVENT

OUR hundred Aero Clubs of the world are to aid in making the First Aerial Derby Around the World as successful event. The plans for the first Aerial Derby Around the World have been submitted to the International Aeronautic Federation by the Aero Club of America and the Club is now advised that the Federation is submitting the plans to the national Aero Club of the world's nations, with a view of having the national Aero Club of each country control the Aerial Derby over which it has jurisdiction. Each national Aero Club in turn will have the assistance of its national Aero Club in turn will have the assistance of its constituent Aero Club within its jurisdiction.

In submitting the plans to the Federation it was suggested that in view of the tremendous development of aerial transportation and aerial navigation it would be advisable to plan to hold the Aerial Derby Around the World annually hereafter. The idea immediately met with favor and the plan is now being considered by the national Aero Clubs affiliated with the International Aeronautic Federation with a view of

holding the Derby annually hereafter.

The adoption of the project by the International Aeronautic Federation greatly simplifies the conducting the Derby, as in each country through which the competitors will pass the national Aero Clubs and constituent affiliated Clubs will look over the establishing of suitable landign places and arranging for receptions, timig ad departures.

#### Derby Pronounced "Most Stupendous Conception" By Allied Authorities.

The aeronautic authorities, as well as leading statesmen, sportsmen, business men and scientists, have pronounced the plans for the Aerial Derby Around the World as "stupendous."

Forty-nine cities in the United States have assured the Aero Club of America that they will make entries. In most cases the contestants will represent the Chambers of Commerce. In other cases they will represent the Aero Clubs, Automobile Clubs and business organizations.

The Commission of the Aero Club of America and the Aerial League of America, which has been traveling eastward and was given a hearty reception by Japan and China and is proceeding around the world, reports that every city visited has promised to make a number of entries. The Commission which visited European countries reports that the Aero Clubs of the Allied countries walcome the proposal for the First which visited European countries reports that the Aero Clubs of the Allied countries welcome the proposal for the First Aerial Derby Around the World and they all promise hearty co-operation. It was their great interest and desire to participate in the First Derby that led the Aero Club of America to submit the plans to the International Aeronautic Federation with a view to having an Aerial Derby Around the World held annually under the auspices of the International Aeronautic Federation and with the co-operation of all the countries represented in the Federation. Leading Airmen of the World are Entering for the Derby.

Leading airmen of different countries are arranging to enter for the Derby. The French aviator who was one of the competitors in the London to Australia flight has entered, and Captain Marechal, the French aviator who bombed Essen and then flew from Paris to Berlin during the war, has ar-rived in the United States and has filed his application for entry with the Aero Club of America. Miss Ruth Law, the famous American aviatrix, is among the score of American aviators who have stated their intention of competing in the Aerial Derby Around the World.

#### Philippines and Australia Want Aerial Derby Competitors to Stop There.

Major J. E. H. Stevanot, president of the Aero Club of the Philippines, has sent a cable asking the Aero Club of America to arrange to have the competitors in the Aerial Derby Around the World stop at the Philippines. He advises that the Philippines will make entries and will offer suitable prizes to have the competitors stop there.

A cablegram has been received from Capt. A. Buckingham of Australia and one from Major Harry Burton Lewis, late of the British Royal Air Force, both entering for the Aerial Derby Around the World.

The recent flight from London to Australia has solved the

problem of the most difficult part of the Aerial Derby Around the World by opening the airways of the East, which was considered the most difficult part of the world to fly over and to find suitable landing places.

The Derby Around the World contestants are permitted to preced in any way they may choose, using any method of transportation they may select for the rest of the journey. The largest prizes will go to the contestants to cover as much of the route as possible by aircraft, but it is left to their discretion as to when and where to use different modes of transportation.

For instance contestants starting from New York may deem it advisable to fly as far as the Pacific Coast and then cross the Pacific Ocean by ship, and then on arriving in cross the Pacific Ocean by ship, and then on arriving in China or Japan take a train to reach a given control in either of these countries, from which he will fly on to the next control, where he may deem it advisable to travel by automobile or train to another control. Another instance: A number of contestants may deem it advisable to combine in chartering a dirigible or large aeroplane and fly across the Pacific or Atlantic. Another instance: A contestant who crosses the Pacific by ship may deem it advisable to charter an aeroplane or dirigible and cross the Atlantic by air, and thereby he can or dirigible and cross the Atlantic by air, and thereby he can, in this leg of the journey, come up to or attain a lead over his competitors and may obtain an aircraft for the flight and obtain a marked advantage over his competitors.

Any of these methods are permitted, and whereas the shortest time elapsed in covering the distance will be an important factor in deciding the winner of the largest prize, when the percentage in the air of any two competitors is equal, skill and saving of time in making connections between controls will give great advantage to the contestants.

#### Piloting Contestants Permitted to Change Aircraft and Take Passage On Aircraft Piloted by Others.

Contestants who pilot their own aircraft are permitted to ship their aircraft whenever and wherever they choose after flying the first fifty miles from the starting point, and are permitted to use as many different aircraft as they desire and to change the type at their discretion. They are also per-mitted to establish at their discretion a relay system through-

out the world to facilitate their journey.

They shall, however, keep an accurate record of change of types of aircraft, giving the date of change and description of new aircraft employed. Piloting contestants are permitted to take passage on aircraft piloted by others, but in such event they shall record the fact on their log books, and, while they will be credited with the air mileage covered as passengers, they will not be credited with this mileage for the special prizes offered for the best record made by contestants who prizes offered for the best record made by contestants who pilot their own aircraft. The First Aerial Derby Around the World is to be an international competition held under the rules of the International Aeronautic Federation, under the auspices of the Aero Club of America, and the Aerial League of America, and the Aerial Touring Association, for the following purposes:

(1) To open the world's airways in the name of Progress and introduce the use of land and water aeroplanes and dirigibles for air travel, aerial transportation and aerial touring throughout the world.

(2 To strengthen the cordial relations and hearty co-opera-tion for the development of international aeronautics which exist between the national Aero Clubs of the countries affiliated with the International Aeronautic Federation and be-tween the national Clubs and the state and city Aero Clubs by organizing this historic world event in which all can par-

(3) To make known that landing places are to aircraft what good roads have been to automobiles, and start action in establishing airports with suitable landing facilities and supplies for land and water aeroplanes and dirigibles throughout

the world.

(5) To foster the establishing of permanent aerial transportation lines throughout the world where aircraft will greatly reduce the time of travel required by other means of

transportation, and the establishing of aerial mail lines throughout the world.

(6) To make known that the aeroplanes which have flown across the Atlantic are to be followed by other aeroplanes capable of carrying fifty or more passengers and affording Pullman car accommodations, and that the British dirigible R-34 is to be followed by other dirigibles many times larger, we being in Great British under construction, which has ten one being in Great Britain, under construction, which has ten millions cubic feet hydrogen capacity, and will lift 303 tons, of which 100 tons will be for cargo, and will be capable of navigating the air for 25 days, or 36,000 miles, without stopping, at a speed of 60 miles an hour.

(7) To foster the design and construction of efficient aircraft with a view to greater range of flight and greater safety.

craft with a view to greater range of flight and greater safety

of air travel.

(8) To test the reliability and economy and bring about im-

provement in aircraft motors.
(9) To bring about increased efficiency in the design of aeroplanes especially fitted for the transportation of passengers and merchandise.

To foster and practice flying by chart and compass and navigating the air entirely by the use of instruments.

The tentative date of start and finish of the Derby, which are subject to change by the International Aeronautic Federation, are: Start on July 4, 1920, and end on July 4, 1921. These dates have been selected because they afford the contestants the possibility of starting going around the world and finishing the trip during the fair weather months in most of finishing the trip during the fair weather months in most of the countries to be crossed, traveling east or west. This is especially true of the weather conditions to be found in crossing the Atlantic and Pacific oceans and the principal mountain ranges to be crossed in going around the world within the zone prescribed. The zone of travel of the Derby is to be confined within an area between 60 degrees north latitude and

15 degrees south latitude.

Within this zone the contestants may select their own route and way of travel provided they cross the Atlantic and Pacific and report to at least one control on the American, European,

Asiatic and African continents.

The Joint Contest Committee of the Aero Club of America and Aerial League of America believes that in allowing the contestants to choose their own routes it stimulates the greatest study as to the possibilities of air travel throughout the world and will result in bringing out the advantage of different routes. Contestants may select and follow any route within this zone.

#### Entries.

Entries can be made by Aero Clubs, national, municipal and civic bodies, Chambers of Commerce, merchants' associations and commercial organizations, and colleges and firms, as well as by individuals.

as by individuals.

The entries can be made through the local Aero Club or Aerial League which is affiliated with the national Aero Club of the country, and said national Aero Club is affiliated with of the country, and said national Aero Club is affiliated with the International Aeronautic Federation. The national Aero Club will transmit the entries to the Joint Contest Committee of the Aero Club of America, New York City, N. Y. In the event that no Aero Club exists in the city making the entry, then the national Aero Club of the country where the entry is made will receive the entry and transmit it, together with the entry fee of \$250, to the Joint Contest Committee of the Aero Club of America and the Aerial League of America, in New York City.

The contestants may be persons of either sex not less than

The contestants may be persons of either sex not less than 21 years of age. They may be aircraft pilots or not, and may own or rent their aircraft or just book passage on aerial transportation lines as passengers. If they are pilots they may enter as such and undertake to pilot their own aircraft throughout the journey and compete for the special prizes offered for the best records made by the contestants who make the largest air mileage piloting their own aircraft, in which case they will be designated as "Piloting Entries," provided they are holders of the Pilot's Certificates issued by the national Aero Clubs of each country under the rules of the International Aeronautic Federation.

If they do not pilot their own aircraft they shall be designated as "Non-Piloting Entries," in which class are included all entries who do not pilot their own aircraft, but fly as passengers either in their own aircraft or book passage on aerial transportation lines.

#### NOW IS THE TIME TO ORDER YOUR PLANE

The reports of the substantial demand for aeroplanes have a double good effect. First, they warn those who want to make sure of getting a plane for the summer that they had better place their orders now. Second, they show that aviating is to be a popular and fashionable sport, beginning this summer.

Newspapers throughout the United States have been print-

ing constructive editorials like the following.

#### Aeroplanes in Demand

(Editorial in Pittsburgh, Pa., Post.)

The war made possible developments in aviation which would nardly have been attained in less than twenty-five years under peace-time conditions. With the return of thousands of army aviators to civil life it might be thought that there would be a lull in the sport of flying. A report just made by a commission appointed by the Aero Club and the Aerial League of America, "for the special purpose of ascertaining the extent of interest in civilian aeronautics throughout the United States," indicates otherwise. There is every reason to believe that the attention which continues to be given aviation assurpages just as notable during the part fav years as notable during the part fav years progress just as notable during the next few years as was made during the war.

The commission, after visiting forty-nine American cities during October and November, reports that "American aircraft manufacturers can sell 10,000 aeroplanes during the coming year for civilian purposes, provided the aircraft industry operates on a business basis as it would do if it wanted to sell automobiles, motor-boats, yachts or any other commodities. Aeroplane dealers in these cities stated they could have sold ten times as many aeroplanes this year if manufacturers had been able to supply the planes. A few manufacturers had been able to supply the planes. A few manufacturers were dinquiries of prospective customers were frank in stating that they could not make delivery within six months, stating that they could not make delivery within six months, as their entire output was sold for six months ahead."

The report is the more interesting because of the statements recently made by witnesses before the military committee of Congress that the aircraft industry in the United States is being allowed to go to ruin. With such a demand as is reported it is obvious that if any such fate overtakes the business it will not be the fault of the public.

Incidentally, if one contemplates taking up aviation or desires a new machine in which to take a flying trip during the summer vacation, now is the time to order the aeroplane.



# THE NEWS OF THE WEEK



Explorer Plans Flight to Pole
London.—Dr. John L. Cope, commander
of the British imperial antarctic expedition which will leave England in the
steamship Terra Nova next June for a
five years' tour of exploration in the

Antarctic, says an attempt will be made to dash to the South Pole by aeroplane "The aeroplane we are taking with us," said Dr. Cope, "is being specially constructed, and will be so designed that it can land on the ice by means of skids. Three men will make the dash for the pole from the top of the great is a boaring at from the top of the great ice barrier at the Bay of Whales.

"From the starting point it will be a continuous climb, since the plane will have to cross a mountain range, with peaks 11,000 feet high. The pilot will be Captain G. H. Wilkins, who participated in the flight between England and Australia. "The plane will be fitted with a patent clader attachment which will be attachment."

sledge attachment, which will be used to carry provisions and equipment if anything happens to prevent the journey being continued in the air. With a full load and crew the aeroplane will weigh 12,600 pounds. Its speed will average ninetythree miles an hour.

"Of the three men in the plane one will be the pilot, the second the navigator and wireless operator, and the third myself. I will be the observer, and my duties will be to chart the country over which we

pass.
"If the weather is favorable I intend to commence the flight for the pole next

Christmas Day.
"The South Pole could be reached on foot only with the utmost of difficulty and great danger. One of the chief difficul-ties I will have to face is the lowness of the temperature. While this may be the case, the work of the British airmen in North Russia during the winter must not be overlooked. There our airmen used planes when the temperature was many degrees colder than it is in the Antarctic

in summer.
"The time I spent marooned on Ross Island after the Aurora (the Mawson expedition ship of 1916) was driven away in the blizzard gave me every opportunity for studying weather conditions. We kept records regarding the weather and continued our research work. Those records convinced me of the practicability of aviation in the Autorotic during the summer tion in the Antarctic during the summer. I am convinced that by using an aeroplane new important discoveries will be made.'

#### Asks Law to Stop Export of Helium

Washington.—Congress was asked on January 24 by Secretary Daniels to prohibit the export of helium. He proposed that five years' imprisonment and \$5,000 be imposed as a penalty.

"The demand for helium abroad is insistent," said the Secretary, "and great enough to consume the available supply in this country in a short time.

#### Aero Club of Oregon Organized

Recently there has been organized in Portland, Oregon, the Aero Club of Oregon, which is affiliating with the Aero Club of America. The officers of the club are as follows: L. B. Hickam, president; George E. Love, first vice-president; George Frost, second vice-president; Archie F. Roth, third vice-president; George Quayle, general secretary; L. Therkelson, treasurer; George M. Kyle, trustee. The location of the main office is in the Oregon Building, Portland, Oregon Oregon, the Aero Club of Orein the Oregon Building, Portland, Oregon.

#### Select Site for Toronto Aerodrome

Fifty acres of land on the Harbor Improvement property has been set aside for the site of Toronto's civic aviation field. The property is valued at over \$2,000,000. As soon as operations begin, a number of Americans as well as British and Canadian aeroplane companies have stated they will purchase factory and hangar sites alongside the public landing ground.

#### Woman Sheriff Uses Air Patrol Wagon

Miss Hazel Riley, a deputy sheriff of Oakland, Cal., is the only woman law officer in the United States who uses an aeroplane in the discharge of her official duties. One of her chief duties is to keep a sharp watch for violators of the automobile speed law.

#### Wireless Phones for Air Travelers-Wireless to Connect With All London Subscribers

London.-Passengers aboard London-Paris aeroplanes may soon be able to call up London by wireless telephone and be connected directly with any telephone subscriber in the city.

This is to be made possible by a wireless station with a 1,500-mile range installed on the top of the new Air Ministry Building, in the heart of London, which is nearing completion.

#### Air Taxis to Fields Where A. E. F.

Battled
London.—Plans are being completed for aerial tours of the American battlefields in preparation for a great rush of transatlantic tourists next summer. A one-day trip starting at Paris and going via Chateau-Thierry to Rheims and Soissons is to be the chief feature. Arrangements are being made for landing places at Rheiras to allow the tourists to enter the ruined cathedral.

The aeroplanes will fly slowly over the American battlefields, passengers being provided with a booklet of serial photographs which locates positions. It is especially allocates positions.

graphs which locates positions. It is estimated the cost of the trip will be 650 francs (normally \$130).

Plan Extension of Air Forest Patrol

Washington.—The effectiveness of the aeroplane forest fire patrol as an aid in discovering and locating forest fires has been proved beyond question, and the new year will see a great extension of the work for the future.

The necessity of the new aerial service

is clearly shown by the great fire losses of the past. The value of just three of the great National Forests is estimated at \$62,280,000. Department of Agriculture statistics show that on an average for eight years (1910-1917) 5,315 fires in the various forests burned 1,163,756 acres of timber, representing a loss of 3,758,356 annually. From 1915 to 1917, 2,873 fires occurred in state and private forests, burning 8,052,945 acres at a loss of \$9,875,000, not including the great Minnesota fire.

From June to August inclusive 745 flights were made. From June to October aeroplane patrol covered 202,009 miles, discovering 442 fires. Twenty-seven of these were reported in advance of the regular forest patrol and were entirely independent of them. The first actual use of aircraft was made in Wiscovering 1010 of the forest patrol. is clearly shown by the great fire losses

entirely independent of them. The first actual use of aircraft was made in Wisconsin in 1915. On June 1, 1919, the first organized and sustained aeroplane forest fire patrol was incurrented. fire patrol was inaugurated.

Get British Planes

Toronto.-One hundred and sixtty upto-date aeroplanes are on their way to Canada from England, the gift of the British Government to the Air Ministry of the Dominion. They will be distributed among the universities of Toronto, McGill and Alberta, where "air" courses



Pilot C. J. Zimmerman landing an Aeromarine Flying Boat on the ice at Raritan Bay, near Keyport, N. J.

#### Liberty Fliers Locate in Fargo, N. D.

594

Earl's Liberty Fliers, recently organized, have decided on Fargo as their permanent headquarters after May 1 of this year, and will locate here with two or more Curtiss aeroplanes for the purpose of carrying on a regular business of exhibitions, passenger flights, cross countries, advertising and photographs.

advertising and photographs.

This will give Fargo a local aeroplane service and pave the way toward bigger things in the aeronautical future of the city. The matter has been taken up with the Fargo Commercial Club, relative to securing a permanent landing field.

Lieut. J. Earl Fladeland, international licensed aviator, and chief pilot of the

Lieut. J. Earl Fladeland, international licensed aviator, and chief pilot of the new concern, last season won the confidence of hundreds who rode with him and is a thrilling exhibition flier. He has a record of 700 hours in the air, of approximately 2,000 ascensions. His record of 67 consecutive loops in a Thomas Morse scout biplane establishes him as an exhibition flier of rare ability.

#### Demand for Liberty Engines

According to latest reports received here the Liberty aeroplane engines are in demand in England. Several British companies have signified their desire to obtain Liberty engines and it is believed that if agencies were established in England by manufacturers of Liberty motors a large number would be sold.

The Liberty engine is very highly considered there for the same class of work for which other engines of this type are used. There has been quite a demand for the engines through the British Air Ministry.

#### Air Taxi Line Incorporated

Charleston, W. Va.—The Bluefield Aero Club of Bluefield, W. Va., which will operate aerial taxi lines in southern and eastern West Virginia, has been incorporated, it was announced here.

#### Rome-Tokio Plane at Salonica

Rome.—The Caproni triplane which left here in the attempted flight to Tokio under the auspices of the Italian Government arrived at Salonica, according to advices received here.

#### Commander Read Arrives at Miami

Miami, Fla. — Lieutenant Commander Albert Cushing Read, U. S. N., and Mrs. Read are here for a month's stay with her mother, Mrs. William Burdine. Mrs. Read was Miss Bessie Burdine, of Miami, and one of the most attractive and popular of the younger set before her marriage to the man who became famous as the first to cross the ocean in an aeroplane.

### Goldwyn Aero Club Is Formed At Culver City, Cal.

At the Culver City studios of the Goldwyn Pictures Corporation, the employees recently formed an Aero Club. Their first act was to subscribe for the purchase of two Curtiss planes. These have already been delivered and are now in daily use. The Goldwyn company is the first motion picture organization in which such an aero club has been formed. Its object is to stimulate both pleasure and business; the business end of it consisting of using the machines for scouting new outdoor locations.

G. M. Manly, an American aviator, originated the idea. He was elected president and treasurer of the club and will be one of the official pilots. The other will be William Wellman, also an American aviator.

The fund for the purchase of the machines was raised entirely among the Goldwyn directors, actors and other studio employees, with the co-operation of Vice-President Abraham Lehr, who donated a plot of ground for hangars and a field.

The Goldwyn aeroplanes render excellent service when players are called to leave Culver City on short notice for some distant location. One machine is almost always in use looking for desirable places for outdoor scenes.

Clara Horton, who is Jack Pickford's leading lady in the new production of "The Little Shepherd of Kingdom Come," has turned aviatrix and is receiving instruction from William Wellman.

Will Rogers, the former famous "Follies" wit and now photoplay actor, had his first trip with Lieut. Manly recently.

#### Winston-Salem is to Help Aviation—Only Private Field in the Whole State

Formation of the Winston-Salem Aviation Company, through the efforts of which Maynard Field was established, was the first venture taken by the city in the interest of aeronautics. Winston-Salem will go on record as being the first North Carolina city to establish a municipal field without government aid. An insight into the prestige gained through the move is seen in a letter received by Mayor Gorrell from the Boston Chamber of Commerce in which the intellectual metropolis of America asks advice as to how it should go about securing a similar field.

Although actual construction of the field may be attributed to the Winston-Salem Aviation Company, the battle for its beginning was fought for many months by the Winston-Salem Board of Trade. The individuals who worked with the Board of Trade committee later became members of the aviation company, to the end that the institution should be placed on a businesslike basis.

It is believed that the next few weeks will bring forth an aerial passenger service between this city and others in the vicinity. In time, possibly, Winston-Salem will be placed on the aerial mail route likely to be established soon between Washington and Atlanta.

Since the short route from the experimental fields in Virginia to Atlanta is via Winston-Salem, Maynard Field will always be a logical stopping-off place for visiting aviators. In commercial aviation, the establishment of additional postal air routes or in the event of war, Maynard Field will increase rapidly in importance.

#### Correction

In our issue of January 19th we stated that Walter Brookins had purchased 447 planes from the Curtiss Aeroplane and Motor Corporation at the Chicago Show. The name should have read B. L. Brookins, who is president of the Southwest Airplane Company—the Curtiss distributors in Texas and Oklahoma.



© International

The twin-Liberty motored Glenn L. Martin Bomber converted into a mail carrier for the Post Office



#### Rausie E-6

A six-cylinder aviation engine, designed and developed by L. E. Rausenberger, who is connected with The Steel Products Engineering Company of Springfield, Ohio, as aeronautical engineers, is about

of the placed on the market.

It is to be known as the "Rausie E-6," and will be manufactured by The Steel Products Engineering Co.

#### Will Fly All Winter

A quiet celebration was held at the Aerodome of the Philadelphia Aero-Service Corporation recently where the afternoon class were receiving flying in-

Pilot Davis had just landed with a student when Manager Hower called the flying force and students about him and announced that the next flight would be the two-thousandth take-off from the field since flying was started in June of last year, and that he took this occasion to thank every one who contributed to the successful inauguration of Philadelphia's first commercial flying project and par-ticularly to thank the pilots and ground men for their unfaltering loyalty and skill by which the present splendid results

had been achieved.

It is feared that not much instruction was attempted during the next flight as Pilot Davis considered it an occasion for an air exhibition such as only the initiated usually witness. With spirals, dips, spins, loops, rolls, and turns of the high school class, the two thousandth flight was successfully given. The Philadelphia Aero-Service Corpo-

ration will continue their flying school throughout the winter. They feel that commercial flying means flying in all sea-

#### New Aeroplane Motor

The Halford Aeroplane is a new engine about to be placed on the market, and is now being built by the Auto Motor Repair Co. of Brooklyn.

The motor is a modified Ford type, with all the best features retained and many refinements introduced. It develops 35-40 h.p. at 1800 r. p. m. The company's engineers state that there is actual reduction in dead weight, without impairment of ruggedness or durability. Some of the features are Bosch mag-

neto ignition or Atwater Kent ignition, Zenith Carburetor, special oversize valves, forced feed lubrication, Zephyr piston special leak proof rings, and special cooling system which permits real cooling.

Two low price models, varying only in speed, range and minor points have been

The motor has been specially built for a small, light, popular priced aeroplane to take off and land in a small space.

Portable Engine Cranker

A portable engine cranker designed and built under the supervision of the Equipment Section, Engineering Division, McCook Field, was successfully demonstrated December 19, 1919. The design allows for the cranking of engines mounted in various aeroplanes, ranging

from the Curtiss Training Plane to the Martin Bombing types, on rough and uneven ground. The outstanding feature of this cranker is that it will accommodate all right hand engines fitted with a standard hub, not mounting a spinner. It develops a starting torque 50% greater than that necessary to turn over a cold Liberty "12."

Air Line for Middle West

C. E. Lay, president of the Cincinnati Aircraft Company, left Cincinnati for Louisville, Ky., via aeroplane, to speak to the Chamber of Commerce in that city in behalf of the proposed air mail line in this territory:. His main aim is to seek support of the various Chamber of Commerce units in the Middle West and South in an endeavor to get their support in ob-taining the approval of Congress. Columbus, Cincinnati, Indianapolis, St. Louis and Red House, Mo., are on the route; the latter is for fuel.

Lay has established fields all over the Lay has established fields all over the Middle West territory for an airline, which is to start at Xenia, Ohio, and work west to Louisiana, Mo. The mail from the West is to come to St. Louis and the mail from the East to Xenia, both head-quarters. The Western Air Line Company, which is now in process of formation, is to be incorporated for a capital of \$2,000,000. When complete Cincinnati is to be the general headquarters. to be the general headquarters.

Plane Saves Cotton Deal

Lima, Peru.—The first commercial aeroplane flight in Peru was recently undertaken when a biplane piloted by an American aviator, Walter Pack, left Lima for Pisco, 130 miles south along the coast, carrying a passenger who represented C. A. Fisk, agent for American cotton buyers. A cotton shipment had been tied up at Pisco by difficulties requiring immediate

settlement or heavy loss to the buyers. The trip takes twenty-four hours by coastwise steamers, which sail every ten days, but the aeroplane made the flight in two hours.

The Acting Minister of Finance, Alberto Salomon, sent a bill to Congress providing for the free transportation of aeroplanes and supplies.

Robert C. Henes, until recently assistant superintendent of the pressed and sheet metal department at Dodge Bros., Detroit, Mich., has been made superintendent of the corresponding department in the Willys Corp. M. W. H. Wilson, formerly assistant to the general works manager of the Cadillac Motor Car Co., Detroit, has been made superintendent of maintenance and equipment at the Elizabeth plant. During the war Wilson served as works manager of the Wright-Martin Aircraft Corp. plant at Long Martin Aircraft Corp. plant at Long Island City and is credited also with laying out the new Cadillac plant that is now in course of construction.

George L. McCain, research engineer for the Packard Motor Car Co., and during the war assigned to the aeroplane engineering department, engine design section of the U. S. Signal Corps at Dayton, Ohio, has been appointed car chassis engineer of the Packard organization. Mc-Cain fills the place left vacant by the promotion of E. G. Gunn to chief engineer of the carriage department,

E. T. Musson, formerly general manager Canadian Aeroplanes Co., has been made vice-president in charge of production of the Buffalo Body Corp. Prior to his association with the Canadian Aeroplanes Co., Musson was superintendent of the Russell Motor Car Co., West To-



Clara Horton, supporting Jack Pickford in his first Goldwyn Picture "The Little Shepherd of Kingdom Come," about to take her initial ride over the Goldwyn Studios, Culver City, Cal.

Albert S. Burleson, Postmaster General Otto Praeger, Second Assistant Postmaster General Leon B. Lent, Assistant to the Second Assistant Postmaster General in Charge of Aeronautics Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying
John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and Operation



**PILOTS** 

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellis
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I. Stanton, Superintendent New York-Washington Division George O. Noville, Superintendent New York-Cleveland Division Edward McGrath, Superintendent Cleveland-Chicago Division William J. McCandless, Superintendent Chicago-Omaha Division Harry L. Hartung, Manager, Heller Field, Newark Herbert Blakeslee, Manager, Bustleton Eugene W. Majors, Manager, College Park Andrew R. Dunphy, Manager, Chicago Maurice J. Kelly, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

**PILOTS** 

Samuel C. Eaton Frederick A. Robinson Elmer G. Leonhardt Walter J. Smith Paul W. Smith Farr Nutter Wesley L. Smith Joseph P. Harris Clayton W. Stoner Mark C. Hogue

#### An Interesting Suggestion

The Post Office Department, as a result of its winter flying thus far this season, calls attention to a problem in aerial navigation resulting from the accumulation of ice on aeroplanes while in flight. It suggests that those who figure some, day on rising with a fully loaded com-

mercial plane to a height of 18,000 or 19,000 feet to take advantage of the reported steady westerly winds; those who would operate a commercial aeroplane line in Canada, or who hope to fly through to Siberia; or even those who would endeavor to operate commercially in the winter in the northern half of the United States, consider the two following

reports of pilots in the Air Mail Service on ships forced down through coating of ice while in flight, which are typical of a half dozen or more forced landings for the same reason during the January operations of the Air Mail between New York and Chicago.

(Continued on page 609)

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-CHICAGO ROUTE

Monthly Report of Operation and Maintenance NOVEMBER, 1919

-			<u>e</u>		Fuel,			P						SEF	RVIC	E AN	D UNI	r cost	
Aeroplane No.	Gasoline	Grease and Oil	Office Force and Watchmen	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time	Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
39A 40A 61 65 66 67 722 74 75 76 81 83 88 88 89 91 92 93 94 95 97 98 99 100 101 103 106 107 107 107 107 107 107 107 107 107 107	\$1.40 21.30 70.43 323.91 276.14 21.30 128.58 433.48 331.70 9.90 115.49 292.79 128.61 285.11 35.30 21.30 332.67 178.40 86.82 77.00 37.21 44.24 482.06 61.60 2.80	\$2.69 7.55 54.71 45.92 2.69 19.10 60.63 49.40 1.25 11.06 39.98 8.50 43.28 6.69 2.69 37.47 23.03 11.19 2.80 6.36 6.24 8.00 8.60	\$93.98 93.98 93.98 93.98 93.98 93.98 93.98 93.98 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99 93.99	\$26.13 26.13 26.13 26.13 26.13 26.14	\$16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75 16.76 16.76 16.76 16.76 16.76 16.76 16.76 16.76	\$32.66 32.66	\$6.46 20.10 64.62 371.49 273.99 19.10 193.43 451.48 339.47 9.05 36.19 342.29 55.29 319.37 49.54 27.71 414.57 178.64 43.51 37.34 11.49 40.34 30.16 41.79 2.73	\$368.08 17.05 42.61 60.56 145.11 130.54 33.50 387.74 125.26 120.88 163.73 72.76 85.66 172.33 30.19 9207.95 97.30 62.98 68.09 30.15 73.11 287.98 283.46 145.67 118.36 30.24 80.40 29.20 29.20 18.56 15.64	\$337.90 24.75 1.07 345.35 78.15  1.07  1.07  1.07  2.07 1.39.85 74.75 49.37 140.80 72.52 49.00 2.50 20.00 61.50 21.00 21	\$75.00 75.00 50.00	\$73.27 73.28 73.28	\$1,023.77 367.45 380.56 495.95 1,533.36 1,097.53 327.23 327.83 424.70 759.17 1,359.27 1,300.08 386.27 544.40 1,147.42 323.01 720.18 1,198.89 448.41 360.92 322.98 419.71 1,505.37 1,031.11 629.39 668.34 339.37 529.67 417.52 516.26 593.79 375.51	5 71 239 1,124 954  71 452 1,501 1,019 268 983 121  71 1,159 655 275 275 293 220	32 2 22 52 39 1 12 39  6 37 5 5  4 1 4	45 20 30 07 56  13 27 24 24 24 31 12 43  25 04 45  30 07 44 03 39 07 44 03 39 19 19 19 19 19 19 19 19 19 19 19 19 19	50 215 649 4,134 2,972 2075 5,041 3,777 120 1,195 504 430 3,622 430 215 4,166 1,625 340 1,625 340 450 550 530	10.0 3.0 2.7 3.1 3.7 3.1 3.6 3.3 3.6 3.0 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7	\$163.18 66.12 35.56 33.32 191.58 33.81 25.94 32.99 367.87 44.62 28.89 112.23 32.34 77.98 31.28 49.73 124.63 124.63 124.63 113.88	1.97 .37 .37 .27 .34 3.23 .46 .31 .31 .42 .33 1.04         
I otal	\$3,399.51	\$409.83	\$3,007.57	\$836.42	\$536.16	\$1,045.19	\$2,280.15	\$3,270.65	\$1,723.63	\$1,871.50	\$2,344.81	\$21,875.42	11,670	4G1	24	37,020	3.2	\$54.49	\$0.59

Cost per mile, overhead, \$.23; cost per mile, flying, \$.20; cost per mile, maintenance, \$.16.

\*Plane No. 103 ran on gas put in during October.

NOTE:—Plane No. 39-A and plane No. 40-A, Curtiss HA, equipped with Liberty 12 motors; planes Nos. 61 to 107, inclusive, and No. 24227, De Havilands, equ.pped with Liberty 12 motors; planes Nos. 202 and 203, Martins, equipped with two Liberty 12 motors.

#### THE 650 H.P. FIAT AIRCRAFT ENGINE

HE 650 Fiat engine, known as Type A14, first made its appearance more or less in experimental form in June, It is the largest and most power ful aircraft engine in use at present, and in many respects the general design follows the well-known characteristics of the 300 h.p. Fiat engines, which in turn are built to a great extent on similar lines to the 260 h.p. Mercédès engines.

Several original and interesting details are incorporated in the 650 h.p. engine, which is a twelve-cylinder, V type, water-cooled, of 170 mm. bore and 210 mm. stroke, ungeared, and is designed to run

at medium speed.

at medium speed.

The normal output of the engine is 600 b.h.p. at 1,500 rp.m., and the maximum 720 b.h.p. at 1,700 rp.m. The brake mean effective pressure is 90.8 lb. per sq. in.

Twelve separate cylinders are employed, each cylinder being attached to the crank case by twelve studs, all of which pass through the base flange of each cylinder. The cylinders are of the same built-up steel construction as used in the smaller Fiat engines, with the cylinder heads integral with the steel cylinder der heads integral with the steel cylinder barrels, and sheet steel water jackets acetylene welded at all joints. Twin inlet and exhaust valves are ar-

ranged in the head of each cylinder at an angle of 25° to the central axis of the cylinder, and all the valves are in phosphor-bronze bushes, pressed into the valve guide bosses formed in the cylinder

heads.

The most distinctive features of the engine are found in the design of the valve gear and the camshafts and camshaft driving gear.

As will be seen in the illustrations, the double valve springs for each pair of

valves are carried separately from the valve stems. The duplex valve springs are mounted one inside the other, and are held in cylindrical yokes or cages which are fixed to the ends of the twin valve stems. Details of this valve mechanism, together with the constructional details of the camshaft central drive through inclined shafts from a layshaft in the crank chamber, are given

The pistons are of aluminum alloy, the The pistons are of aluminum alloy, the heads being domed and heavily ribbed. They are somewhat similar in design to those used in the 260 h.p. and 300 h.p. Fiat engines, except that in this instance the gudgeon pins are fixed in the connecting rod small ends, and work in phosphorbronze bushes cast into the gudgeon pin hosses in the pistons.

bosses in the pistons. H section, fork-type connecting rods are used, the forked rods being fitted with bronze bearing shells, white-metalled on the inside where they run on the crank pins. The centre rod has a case-hardened steel liner running on the outside of the

bronze shell of the forked rod.

The six-throw crankshaft is necessarily very massive in its proportions, and runs in plain white-metal bearings. The front journal is mounted in two large diameter ball bearings carried in a steel housing, between which are carried the two thrust ball races for the propeller, which is carried on an extension

of the crankshaft.

Several interesting features are found in the design of the crank case. This, as usual, is of aluminum, in two parts. The transverse webs which form the main bearing housings are of box formation. The main flanges of the top and bottom halves are exceptionally well bolted to-

gether, a large number of bolts being used, set well back from the edges, and the careful ribbing and radii throughout the crank case are noticeable. The crank-shaft main bearings are held between the halves of the crank case—i.e., the bottom halves of the journal bearing housings are cast integrally with the bottom half of the crank chamber.

Two duplex Fiat carburetters,

having two float chambers, are fitted between the two sets of cylinders, and feed respectively the six front cylinders and the six rear cylinders. The apertures of the main jets are variable for the purpose

of altitude control.

The induction manifolds are large and well designed, and each is provided with a large priming cup, which is fitted with small copper priming pipes insides the induction manifold, leading to each of the

induction ports.

Ignition is by four six-cylinder Dixie magnetos, situated transversely in pairs at each end of the crank chamber. drive is by bevel gears on the extremities of a longitudinal shaft working inside the tubular layshaft, which drives the cam-shaft inclined shafts. This layshaft, as shown in the general arrangement of the engine, is situated in the centre of the top portion of the crank chamber. Four sparking plugs per cylinder are fitted.

#### Cylinders

The cylinder heads are integral with the cylinder barrels, which are machined from steel forgings in the usual manner. As will be seen from the illustration of one of the cylinders, the water jackets are of exceptional depth, extending almost to the bottom of the cylinder barrels. They are built up from die-pressed sheet steel, acetylene welded at the joints. The valve seatings are machined in the cylinder heads, and the valve guide hous-ings are welded into the valve pockets. The cylinder barrels extend 45 mm. into

the crank case below the base flanges, which are 10 mm. in thickness, and are, of course, integral with the barrels; a recess is machined on the face of the spigots. Each cylinder is bolted down to the crank case independently by twelve the crank case independently by twelve 10 mm. studs, which are screwed into the machined faces of the crank chamber, and are also secured by nuts, which are locked by riveting over the threads of the studs into two slots cut in the heads of the lock-nuts.

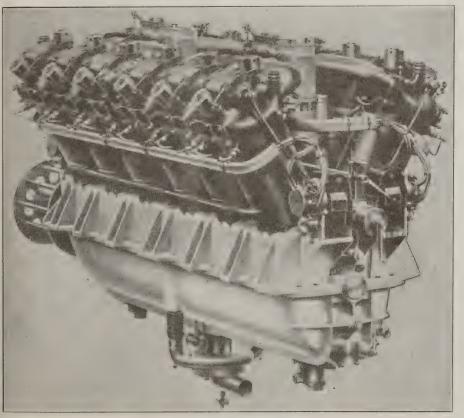
The four phosphor-bronze valve guide bushes are pressed into the steel water-cooled housings in the valve pockets in

the usual way.

As shown in the illustration of the cylinder, water connections are provided both at the top and bottom of each water jacket between each pair of cylinders, and jacket between each pair of cylinders, and the usual type of rubber ring joint is used to make the water joints. The capacity of each cylinder jacket is four pints. The weight of the cylinders, considering their size, is exceptionally low, being 36.75 lb. bare, or, taking the weight of each cylinder, including the four valves with their duplex springs and cages complete, the weight equals 41.5 lb. each.

#### Valves and Valve Gear

The inlet and the exhaust valves, which work at an angle of 25° to the central axis of the cylinders, are of the same diameter



The 650 H.P. Fiat Aircraft Engine

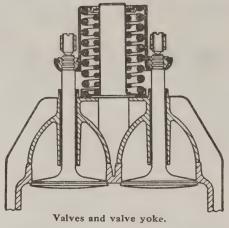
across the heads, *i.e.*, 71 mm., but there is a slight difference in the dimensions and weights of the valves, the exhaust valves being made a little thicker and heavier in the heads. The valve stems are all of 12 mm. diameter, and all are 120 mm. in overall length. The effective port diameter of all the valves is the same, *i.e.*, 66.5 mm., which gives a velocity through the inlet valves of 236 ft. per sec., the maximum lift of inlet valves being 11.9 mm.

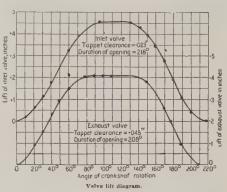
Mention has already been made of the unusual design of the duplex valve springs, and for each pair of twin inlet or exhaust valves two helical coil springs are provided. These are arranged concentrically one inside the other, and are contained inside a steel cylindrical yoke or cage. As shown in the illustration, they are quite separate from the valve stems. The inner spring is mounted on a central guide tube, and the base coils of each of the two springs are retained in a flange welded to the cylinder head between each pair of valves.

The outer spring is retained by the spring yoke, whilst the inner spring is held in position by a collar, which floats on the guide tube, and is located in a recess formed in the top of the yoke. The valve spring yoke has a pair of lugs, one on each side, by means of which it is coupled to its two valves, and into which fit the ends of the valve stems. The stems are held by a split locking cone, as shown in the illustration. The ends of the valve stems are turned with three grooves, on to which fit the halves of the split locking cone. The halves of the cone are held in position by a spring ring, the locking cones being sunk in the cupped holes in the lugs on the spring yokes.

#### Camshafts

The two overhead camshafts are enclosed in cast gunmetal cases, which are attached to the top of each cylinder by





four studs screwed into the cylinder heads. Each camshaft runs in eight plain bearings cast in an aluminum alloy. The construction of the camshaft bearings, which follows the well-known Mercédès design, comprises two halves bolted together, and erected complete with the camshaft from the end of the cam case.

The twin valve rockers are mounted on

fixed rocker spindles, which are held in position by the four studs screwed into the cylinder heads for the purpose of holding down the camshaft cases. The fulcrum bearings of the valve rocking levers have phosphor-bronze bushes, lubricated by four holes drilled in the lever. Hardened steel rollers of large diameter are fitted on the cam arms of the rockers.

The method of mounting the valve rocker arms may be noted. As will be seen in the illustration, the valve arms of the rockers work outside the cam boxes, and are provided with felt oil-retaining washers, which fit into annular grooves machined in the cam boxes and their covers.

Each camshaft case is constructed in two parts, and the camshafts are driven by bevel gears from the centre instead of from the ends. This central camshaft drive is very neatly arranged, the construction being as follows: a tubular layshaft, running on ball bearings, is mounted in the centre of the crank case in the top of the V. This shaft is driven from the rear end of the crankshaft by spur gearing, and, as shown in the general arrangement, it extends as far as the centre of the engine. From this point two inclined shafts drive the camshafts through bevel gears at their top and bottom ends. The inclined shafts run in ball bearings, and are enclosed in cast gunmetal cases, which are secured to the machined faces of the top half of the crank case by six small studs.

#### Pistons

These are of aluminum alloy, and weigh slightly over 6.5 lb. each, complete with rings. The heads, as shown in the illustration, are slightly domed, the thickness of the crown being approximately 15 mm. The crown is supported by twelve radial arched webs.

Contrary to previous Fiat practice, the bosses are lined with plain phosphor-

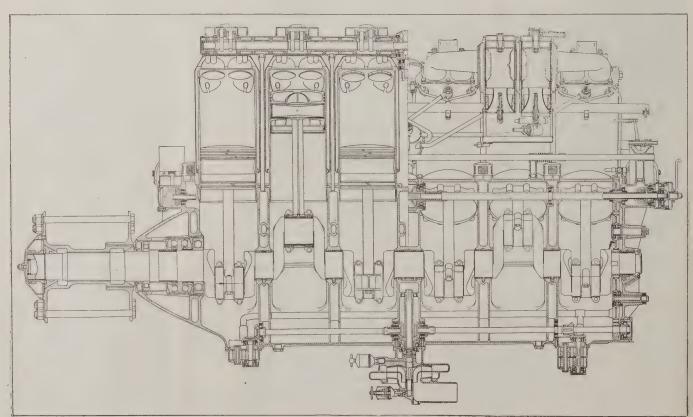


Diagram of 650 H.P. Fiat Engine

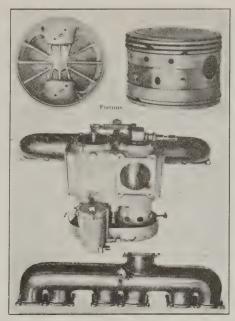
bronze bushes, in which the ends of the gudgeon pins work. The bushes are pressed into the piston and fixed with tapered grub screws. The gudgeon pins are 40 mm. diameter, and the bronze bushes are 47 mm. in length. Oil holes are dealed in the beauty hushes for are drilled in the bosses and bushes for lubricating the gudgeon pins, which are fixed in the small ends of the connecting rods by means of a taper pin passing through the centre of each.

Four piston rings are provided, three compression rings being above the gudgeon pin and one scraper ring below at the base of the skirt.

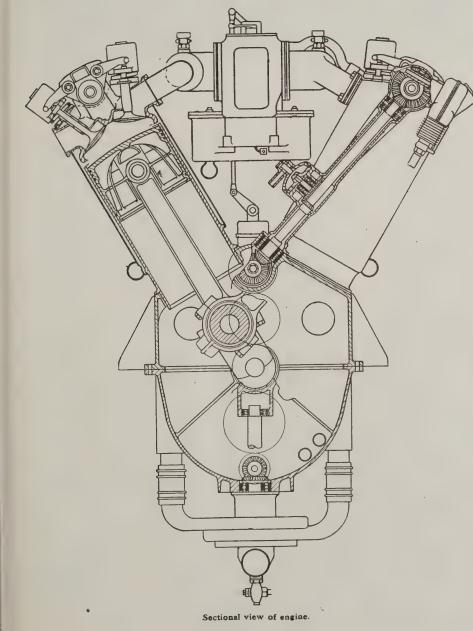
Eight 10 mm. holes are drilled obliquely through the recessed part of each skirt for lubrication, and the piston walls are also drilled with eight 10 mm. holes below the bottom compression ring.

#### Connecting Rods

The connecting rods are H section, of rickel chrome steel; they work in pairs on common cranks. As shown in the illustration, the big end of one of each pair of rods is forked, whilst the other is plain. The bottom ends of the forked rods are bridged, and the big end caps are fitted with four botts. fitted with four bolts, two bolts being



Pistons, Carburetor and Induction Pipes



fitted to the plain rods. The big end bolts are screwed into the ends of the rods, and are locked by plates under the shouldered heads of the bolts.

The forked rod grips the outside of the

split big end bearing shell, whilst the plain

rod works on the centre portion of the shell, which is of phosphor-bronze.

The big end of the plain rod is lined with a hardened steel shell, which is made in two parts. The shell is presented from turning by a steel grub screw in the rod, and four holes are drilled through for lubrication.

The float of the gudgeon pin is 7 mm.

#### Crankshaft

An illustration of the massive sixthrow crankshaft accompanies these notes, but the construction of the front portion of the crankshaft differs slightly from the latest design, as will be seen by comparing it with the general arrangement drawing. ment drawing.

ment drawing.

The weight of the crankshaft, with its double thrust and two ball race bearings, is 212 lb., including the steel housings for the ball races. The diameters of the journals and crank pins are all 80 mm. The centre journal is 92 mm. long, whilst the other journals all measure 57 mm. long, and the length of all the crank pins is 90 mm.

For the lubrication of the crankshaft and big end bearings the journals and crank pins are all bored with 40 mm. diameter holes, the ends of which are plugged with brass caps, and the crank webs are drilled in the usual manner.

#### Crankshaft Bearings

The six plain journal bearings are split in the usual way, and are held together by the two parts of the crank chamber.

The journal and big end bearing shells are machined with a recess to take the white metal lining, which is approximately 2 mm. in thickness, and the recess is taken as far as the 5 mm. radius at each end of the bearings. A sectional arrangement of the front journal ball bearings and double the tront journal ball bearings and double thrust race is shown in the arrangement drawing. The rear end of the front journal is 95 mm. in diameter, and is mounted on a large ball race, 170 mm. diameter, whilst the front end of the crankshaft journal bearing is carried by a smaller ball race 150 mm. diameter. Between the ball race 150 mm. diameter. Between the two load bearings two large double ball thrust races are provided. The central thrust ring, which is a push fit on the front journal, and takes the crankshaft thrust in both directions, is secured in position by a collar, which forms a distance piece between the thrust ring and the large rear ball race. The thrust ring is locked by a split steel collar fitting is locked by a split steel collar fitting flush into a recess in the crankshaft journal, and is secured by a steel collar driven over the split locking collar as far as the flange.

Both the case thrust rings are provided with bevelled outer faces, which bed into the steel seating rings. The whole bearing assembly is contained in a cylindrical steel housing, and the rear seating ring of the thrust race is screwed into the rear end of the steel housing, thus providing an effective method of adjustment for the

thrust bearings.

The steel housing for the front bearings is, of course, held between the two parts of the crank case, and is located by two pegs. An oil-thrower ring is fitted on the front end of the front journal, as shown in the drawing.

(To be continued)

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### "ATLANTIC" TYPE VICKERS CONVERTED FOR COMMERCIAL USE

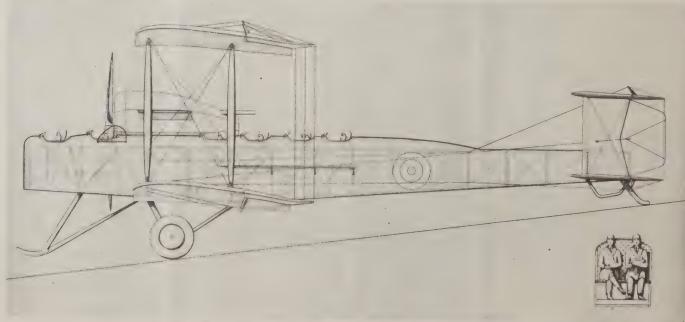
HE main design of this machine is identical with "The Vickers-Vimy Rolls", the only successful aeroplane to cross the Atlantic.

Steel enters largely into the construction which makes this type especially suitable to tropical climates, and in countries where extremes of temperature are encountered. The key-note of the "Vimy" construction has been to design an aeroplane which shall carry the useful load of over five thousand pounds, and yet be as small and handy as possible. When the dimensions are compared with other standard aeroplanes carrying a similar load, with fuel and oil for six hours, and 12 persons, the small overall dimensions of the "Vimy" are remarkable.

This small size has been attained without excessively heavy loading. The weight per square foot of supporting surface, and per H.P. of the engines, is lower than usual on large aeroplanes, thus permiting the unusualy high speed and rapid climb for which the "Vimy" is so well known.

This desirable quality has been arrived at by careful design, and by improved methods of manufacture. There is not an ounce of unnecessary weight, nor is there a weak point, the construction being uniform and consistent in strength and quality.

The machine is stable, having a dihedral angle of 174° (or 3° on each side), a longitudinal "Vee" of 178° and ample fin area to give directional stability. It is fitted with This small size has been attained without excessively heavy



Diagrammatic view showing seating arrangement in converted Vickers

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a compensating device so that it can be flown "hands off"

a compensating device so that it can be flown hands off at any speed, whether level, climbing, or gliding. The slow and landing speed is 45 m.p.h. The speed with one engine is 70 m.p.h. Consequently failure of one engine means reduction of speed only, and not a forced landing.

In construction, the spars are of box section of spruce and 3-ply wood, bound with fabric; the interplane struts are of hollow spruce, except in the engine bay, where the struts are of round steel tube, reinforced where necessary and are of round steel tube, reinforced where necessary, and with wooden fairings; the ribs are of spruce. The engine mounts are carried on four struts each side, and the chassis is attached below the engine mountings, thus minimizing the stress on the anti-lift wires.

The front of the fuselage being constructed of steel tube.

The front of the fuselage, being constructed of *steel* tube, is very rigid, and this construction is carried back as far

as the rear spars.

To the rear of this point, a special wooden tube is used for the longerons under Vickers-Ryan Patents. The petrol tanks are supported on steel tubes. The fuselage is braced with swaged steel tie rods.

Arrangements can be made to enclose the passengers when the machine is used in cold climates.

Throughout the machine streamline steel tie rods are used in external bracing, and round steel tie rods in all internal bracing; looped wires and ferrules are not used in any important part.

The engine controls are operat with short cable connections. The cable and follow standard practice. controls are operated by concentric shafts The main controls are of

The petrol supply is maintained by fan-driven petrol pumps, with regulating valves, to maintain a constant flow to a service tank, with overflow return to main tanks.

All flying controls are remarkably light in operation, due to the provision of balancing surfaces where necessary.

Crow—(2 pilots at 180 lbs.)         Petrol—(232 gallons)       1,         Oil—(18 gallons)       1,         Reserve water—(4 gallons)       1,         Passengers—(10 at 180 lbs.)       1,         Various       1,	200 1 360 1 670 1 180 1 40 1 800 1	lbs. lbs. lbs. lbs. lbs. lbs.
Total weight :	650 i ====	IDS.
Overall length         42'           Overall height         15'           Span         67'           Gap         10'           Chord         10'           Incidence of main planes         3½           Dihedral of main planes         3	8" 3" 0" 0" 6"	
Area of main planes       1,330         Weight per square foot       8.79         Weight per nominal H.P. (2 x 350)       16.6	1bs	
Time to 6,000 feet	mi mi mi	ns.

Endurance 600 miles at cruising speed of 90 m.p.h. at 6,000 feet.

# THE DIFFICULTIES ENCOUNTERED IN BALANCING PROPELLERS MADE OF QUARTER SAWN MATERIAL

By E. F. HORN

Assistant Engineer in Forest Products, Forest Products Laboratory, U. S. Forest Service, Madison, Wis.

N spite of all the precautions taken to combine laminations I in propellers in a manner to secure wood of equal density in the two blades, there are always a number of propellers which cannot be balanced during the finishing process if specifications are strictly followed. It is required that all laminations in a given propeller shall be carefully balanced both horizontally and vertically. The methods of balancing laminations before claims were comparished in different plants. The

norizontally and vertically. The methods of balancing laminations before gluing vary somewhat in different plants. The following method appears to give the best results.

The laminations are first placed, one at a time, on balancing ways and their heavy ends marked. After this is done it is advisable to mount the laminations on a hardened steel mandrel in their regular order and to test them out collectively on balancing ways against with best days of the laminations. on balancing ways equipped with hardened steel knife edges. The ends of the laminations should be reversed to secure the

The ends of the laminations should be reversed to secure the best possible balance before the propeller is glued.

If there is only a slight variation in weight between the two ends of the laminations, very good balance is likely to be secured by alternating the heavy ends. Occasionally a lamination will be found with a great difference in the weight of the two ends. The amount of this difference can be approximately determined by balancing the lamination flatwise on a knife-edge balancing stand with gram weights on the light end. If the difference in weight between the two ends is excessive, the lamination cannot be combined in a propeller excessive, the lamination cannot be combined in a propeller with other laminations which are more uniform in density without affecting the balance of the finished propeller. The difference in density of the wood in the two ends of some laminations is sometimes so great that a fifty-gram weight placed on the light end four feet from the center of the hub is required to balance them.

The percentage of propellers which are rejected at manufacturing plants depends chiefly upon the kind of wood used, whether it is quarter cown or flat-cown, and upon the methods.

whether it is quarter-sawn or flat-sawn, and upon the methods

followed to secure wood of uniform density.

of 208 experimental propellers made at the Forest Products Laboratory, Madison, Wis., 41, or 19.7 per cent of the total number, did not balance perfectly during the finishing process. This unusually large percentage is accounted for in several ways. Many of the propellers were made of mixed density material in order to determine what effect the combining of laminations of different density would have upon the symmetry and shape of the finished propeller. Propellers made of laminations of mixed density are more difficult to balance than those made of laminae of uniform density.

None of the propellers made were sheathed or tipped with metal, leather, or fabric, nor were marking plates inserted. It is often quite possible to balance a finished propeller during the metal tipping process, by filing away a little more metal

from the heavy end.

A finished propeller, to be in perfect balance, must stand at any angle on the balancing ways without showing persistent motion in any direction. It is possible for a propeller to balance horizontally and not vertically. If the two blades of a propeller are symmetrical and the propeller is of the same moisture content throughout, its horizontal balance will depend upon the uniformity of the density of the wood in the two blades. Its vertical balance depends upon the equal distribution of density throughout the two blades and both sides. tribution of density throughout the two blades and both sides of the hub. If the density of the wood is higher or lower in one side of the hub than in the opposite side, the finished propeller will be out of balance vertically even though it may balance horizontally.

More difficulties are encountered in balancing propellers made of quarter-sawn oak than of flat-sawn material. This is because the density of the wood of many hardwoods grown in the temperate zone varies with its position in the tree. The density of a piece of wood depends upon the amount of wood substance it contains, which in turn depends upon the relative amount of spring-wood and summer-wood. These factors vary greatly, hence the variation in the density of the wood throughout the tree both longitudinally and transversely. wood throughout the tree both longitudinally and transversely.

wood throughout the tree both longitudinally and transversely. The wood in opposite ends of eight-foot logs of certain species will often vary as much as 0.06 in specific gravity.

The maximum variation in the wood density of an individual tree is in a radial direction. With hardwood timber grown in the temperate zone there is often a very great variation in density between the wood in the heart of the tree and in that just inside the bark. This does not apply to certain tropical hardwoods. The wood in logs of African mahogany and true mahogany is fairly uniform transversely, but the density may be somewhat variable in the opposite ends of an eight-foot log.

of an eight-foot log.

With such hardwoods as oak, a board sawn tangentially to the annual rings, or flat-sawn, contains fewer annual rings than board sawn at right angles to the annual rings, or quarter-sawn. Laminations cut from flat-sawn material are therefore likely to be more uniform in density throughout than those cut from quarter-sawn material, since the quartersawn board material may possess both the longitudinal and

transverse extremes of density. The radial variation in density is often very great with certain hardwoods, such as white oak, where the density in opposite sides of the hub of a lamination may vary as much as fifteen pounds to the cubic foot. Figure 1 shows assume a secretary of the control of the cubic foot. foot. Figure 1 shows common variations in density of quarter-sawn oaks.

At the Forest Products Laboratory a record was kept of the density of the wood on either side of the hub of laminations cut from quartered red oak and quartered white oak. Table I shows the amount of this variation in density between

the heart and sap sides of the hub.

TABLE I

Number of Laminations										
Kind of Wood	specific	Gravity variation less than	variation	Gravity variation between	Gravity variation between	Gravity variation between				
Quartered Red Oak	I	65	65	103	15	I				
Quartered WhiteOak		6	12	31	5	3				

The data in the above table shows that the density of the wood on either side of the hub, when laminations are cut from quarter-sawn lumber of these species, varies widely between individual boards, the variations of the greater number of laminations being 0.1 and 0.2.

The lumber from which these laminations were cut was secured from sawmills regularly manufacturing this class of material, and the data therefore shows the variation in density which can be expected in commercial shipments of quarter-sawn lumber of these species. However, the data does not prove that the density of the wood in all trees of these species decreases regularly from the center of the tree to the species decreases regularly from the center of the tree to the outside. The density of wood two to four inches from the center of the tree may be equal to or greater than the wood at the center. The wood just inside the sapwood of small trees of these species is often of greater density than the wood in the center of the tree. As forest-grown timber of the above species becomes older and attains a large size, the density of the wood formed during this period of the tree's growth is much lower than the wood formed during the early life of the tree. This appears to be true in the oaks, regardless of the number of rings per inch as is shown in Figure 1. less of the number of rings per inch, as is shown in Figure 1. Large-sized timber is required to produce quarter-sawn propeller stock nine inches and wider, and the data in Table I shows that this variation is uniformly higher in the heart edge of the lamination than in the portion next to the sap. This uniformity is of sufficient importance to be considered in the manufacture of propellers of quarter-sawn material.

If laminations of quarter-sawn material are arranged in a propeller so that the heart sides of the laminations are all on the same side of the propeller, it is very doubtful if the propeller can be balanced vertically during the finishing process. Such a combination of quarter-sawn laminations may also affect its horizontal balance. The leading edge of a propeller is rounded in opposite directions in such manner that high density material is taken off one blade and low density ma-



Showing the relation of density with relation to distance from center of tree

terial off the other blade. If the density of the wood in the opposite sides of the laminations on the leading edge is variable, it is not likely to balance horizontally when it is finished.

In the manufacture of propellers from quarter-sawn lumber of all hardwoods grown in the temperate zone it is therefore advisable to alternate the heart and sap edges of laminations when they are combined into propellers in order to secure a uniform distribution of the high and low density material. The heart or sap edge of all quarter-sawn laminations should be marked when they are laid out, as it is not always easy to distinguish them after convince. to distinguish them after sawing.

Combining quarter-sawn laminations in this manner will not eliminate all of the balancing troubles in propellers manufactured from this class of material, but it is believed that it will very materially reduce the number of propellers rejected

on account of balance.

#### **BOOK REVIEWS**

DESIGN OF AEROPLANES. By Arthur W. Judge, A.R.C.S

The great demand for this book has made it necessary to bring out an early second edition. A new chapter dealing with fuselage design and construction has been added and the printing errors corrected. This volume is the outcome of an endeavor to fulfill an aeronautical need, which must have been experienced by most designers, draughtsmen and students in entering the field of aeronautics, namely, the absence of collected data and design methods. This is fully illustrated and contains numerous tables.

Contents: General Design Principles; Estimation of Aeroplane Weights; Some Design Considerations; Characteristic Curves of Performance; Stresses in Aero-planes; Tables of Strengths and Prop-erties of Materials; Tables of Weights; General Information and Aeronautical Data; Bibliography; Principles of Con-struction of the Wing System; Principles of Undercarriage Design; Mechanical Principles Involved in Aeroplane Design; Fuselage Design; Tables of Equivalents;

This volume can be purchased at the Aeronautic Library, Inc., 299 Madison Avenue, New York City, N. Y. Price, \$5.50 net; \$5.75 postpaid.

RINCIPLES OF RADIO TELEGRAPHY. By
Cyril M. Jensky.
This book has been prepared for stu-PRINCIPLES

dents who desire a thorough knowledge of radio engineering, but who have made no elementary study of radio. It assumes a good knowledge of mathematics and is particularly adapted to students trained in mathematical demonstration of theories.

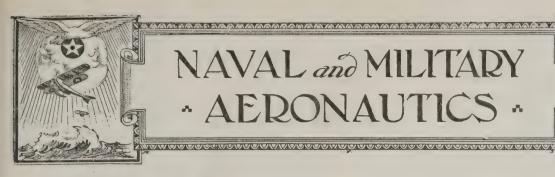
Practical problems at the end of each chapter show the application to actual problems such as arise in the design of radio equipment. Although intended primarily as a text-book its excellent index and diagrams make it an excellent text

The work is divided into eight chap-The work is divided into eight chapters: I, Magnetic Phenomena; II, Electrostatic Phenomena; III, Electromagnetism; IV, Units of Measurement; V, Electromagnetic Waves; VI, Elementary Alternating Currents; VII, Oscillatory Circuits; VIII, Radio Circuits; IX, Practical Transmitting Appliances and Methods; X, Practical Receiving Appliances and Methods; XI, Vacuum Tubes and Their Use in Radiotelegraphy.

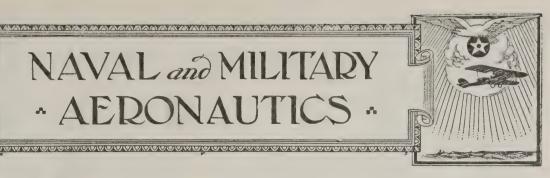
The book is procurable at the Aero-

The book is procurable at the Aeronautic Library, Inc., 299 Madison Avenue,

New York.



# AVAL and MILITARY EDONAUTICS



#### New Air Policy In Effect For Army-Under It Specific Functions Are Designated For Army, Navy and Marine Flying Corps.

Washington.—Secretary Baker has put washington.—Secretary Baker has put into effect so far as the Army is concerned the new Army-Navy policy relating to aircraft which has been approved by the Joint Army and Navy Board on Aeronautics, as well as by Secretaries Baker and Daniels.

Under this policy aircraft to be used in wartime operations are to be designated Army aircraft. Navy aircraft and Marine aircraft. Army aircraft will be provided by the War Department and manned only by Army personnel. Navy aircraft will be provided by the Navy Department and manned by Navy personnel. Marine air-craft will be provided by the Navy De-partment and manned by the Marine air personnel, which is a branch of the Naval Air Service.

Specific functions have been mapped out for each of these branches of the Air Service. Army aircraft will carry out operations from bases on shore as an arm of the mobile Army, or against enemy aircraft in defense of all shore establishments, and also alone or in co-operation with other arms of the Army, or with the Navy, against enemy vessels engaged in attacks on the coast.

The function of Navy aircraft will be to conduct operations from mobile floating bases or from naval air stations on shore, as an arm of the fleet, or for overseas scouting, as well as to protect coastal communications or operations against enemy establishments on shore when such operations are conducted in co-operation with other types of naval forces, or alone when their mission is primarily naval.

The functions normally assigned to Army aircraft will be performed by the Marine aircraft when the operations are in connection with an advance base in which operations of the Army are not represented.

#### Name of "Joint Army and Navy Board on Aeronautics" Changed

The Secretary of War and the Secretary of Navy have agreed to change the name of the "Joint Army and Navy Board on Aeronautics" to "Aeronautical Board" and all communications, etc., to be forwarded to this Board will be addressed as above.

The present members of the Board are: Major General Charles T. Menoher, Director of Air Service, Chairman; Lieut. Col. George A. Nugent, C. A. C., U. S. A.; Lieut. Col. Byron Q. Jones, A. S. A.; Captain Thomas T. Cravent, U. S. N., Director of Naval Aviation; Captain Lyman A. Cotten, U. S. N.; Commander J. C. Hunsacker, U. S. N.; Commander Warren G. Child, U. S. N., and Lieut. Col. A. R. Christie, A. S. A., Working Committee; and Captain A. J. Clayton, A. S. A., Secretary. The present members of the Board are

The duties of this Board are to consider and make recommendations for prevention of duplication; to secure coordination in the plans for new projects for construction of aircraft, for experimental stations, coastal air stations and for stations to be used jointly by the Army and Navy, as well as questions relating to the development of new types of aircraft and weapons used on aircraft, and other important questions relating to Government activities.

#### Authority Given to Place Enlisted Men On Flying Status

The Secretary of War has advised the Director of Air Service that he is authorized hereafter to issue orders placing enlisted men of the Air Service, U. S. Army, who may be attending naval air schools or who may be on detached service at naval stations, on flying status, when such enlisted men are on duty at these naval air schools or naval stations requiring frequent aerial flights, as contemplated in Paragraph 1342½, Army Regulations.

#### Carrier Pigeons at Ross Field Doing Excellent Work

Many of the balloon schools have demonstrated the superiority of pigeon liaison over all other means of communication in free balloon flights. or homing pigeons at Ross Field are doing excellent work. Twenty-two pigeons are now being trained at this post for flights up to about fifty miles, and twenty six "squeakers" are ready for their first exercise about the loft.

Recently a Board of Air Service and Artillery officers headed by Colonel Prentice of the Air Service, while inspecting this field, visited the Observation Camp belonging to Ross Field on Mount Harvard, near Mount Wilson. This camp This camp is at an elevation of approximately 5,000 feet and is six miles in an air line and about 14 miles by road from the post. Four carrier pigeons were carried with the party and one of the birds flew back to camp in four minutes after being re-leased, thus making the excellent time of one and one-half miles to the minute.



The Vickers "Vimy-Commercial" Biplane



#### FOREIGN NEWS



Flying Reviving in Peru

Flying Reviving in Peru

Lima, Peru.—Aviation in Peru and in Bolivia is rapidly taking on new life, following four or five years of inactivity, and subscriptions have been inaugurated, or are about to be inaugurated, in various sections of Peru for the purchase of machines to encourage the development of flying.

G. M. Dyott, of the Royal Aviation Force, expects within a short time to have hydroaeroplanes operating both on the West coast and on the Eastern rivers. The French military mission, will, within a few months, have several pilots and eleven machines in Peru, two of which are expected within the month, and will be in charge of a veteran American pilot.

Recently Lieut. Protzel of the Peruvian Army, who obtained his pilot's license at the Argentine Aviation School, has been making flights over Lima and Callao in his Farman machine, and his pupil, Senor Espinosa, has been making flights in the old government Bleriot. This plane was purchased by the Government many years ago, and was allowed to fall into a state of decay until Senor Espinosa patched it up into flying condition. Senor Montoya, a third Peruvian pilot to take his license at the Argentine school, is also flying a Farman.

In Bolivia, according to the South Pacific Mail, the Government has entered into a contract with Lieut. Donald Hudson to conduct a Government school of flying.

#### Japanese Air Post Stamps

To the ever-growing list of aerial postage stamps two new varieties have just been added from Japan, where they were issued in connection with an experimental air post between Tokyo and Osaka. They consist of the ordinary 1½ and 3 sen postage stamps, distinguished by the addition of a device representing a monoplane in flight, in the form of an overprint. The overprint is in red on the 1½ sen and in black on the 3 sen.

#### A New Machine for Poulet

Although a message from Rangoon announced that, following trouble with a propeller and then with one of his engines, Poulet had decided to pack up his machine and return to France, word comes from Paris that his friends in France have bought him a new Caudron which has already been shipped from Marseilles to Calcutta, and that he will continue his flight to Australia.

Chile Plans Air Mail Service
Santiago, Chile.—The Minister of the Interior has asked the Ministers at London and Paris for reports on the best systems for the organization of an aerial mail service. The President of the Republic officiated at the opening of a porcelain manufactory during the week.

#### D'Annunzio Warns Paris Against Tiger

D'Annunzio Warns Paris Against Tiger

Paris--Toward the end of the afternoon, after the Presidential elections, little green papers fluttered down on Paris from the air. They contained a message from Gabriel d'Annunzio, the Italian insurgent leader at Fiume, brought by Lieut. Carminiani of the poet's air squadron. The Lieutenant left Fiume at 7:30 o'clock in the morning, accomplishing the flight by way of Venice, Turin, Chambray, Lyons and Dijon. He crossed the Alps at a height of 4,000 meters.

The message was a greeting to the Latin brothers of the Italians at a moment when "the outworn politicians are trying to raise against young France a headstrong old chief who does not appreciate and wounds the freshest forces of the new life. If the injustice against Italian Fiume and the Italian towns of Dalmatia is consummated, a combat is inevitable and blood must be shed."

#### New Air Minister

Major G. C. Tryon, M. P., has been appointed Under Secretary for Air, in succession to Major-General the Right Hon. J. E. B. Seely, C.B., D.S.O.

#### An Italian Government Competition

Word comes from Rome that the Italian Government proposes to organize a competition for prizes aggregating 2,000,000 lire (\$380,000 at pre-war value) for aeroplanes intended for post and commercial work.

#### Australia-Tasmania Air Mail

An air mail between Melbourne and Tasmania was started when Lieut. Long flew an Alliance machine across the Bass Straits from Hobart. A Sopwith also flew in the reverse direction from Melbourne.

#### Brazil and Aviation

Two Brazilian aviators, Alzir Rodrigues and Bento Ribeiro, have been selected by the Government to proceed to England and the United States to visit aviation works.

Thirty aeroplanes have been bought for the Brazilian Army, in France.

Spain Buys Planes from British Firms
Madrid.—Spain is making a serious effort to improve her flying service and has just placed a contract with a British company for 52 machines of the latest models. Some are to be used in Morocco.

The Government has engaged a number of British pilots to instruct flying candidates. These are numerous and include the Infanta Alfonso of Orleans, who, although he has had previous experience in the air, is taking instructions under the British experts.

Air Ministry Competitions

One, at any rate, of the faults in the Air Ministry Aeroplane Competitions pointed out by Aeronautics has been receiving attention. We understand that the regulation limiting one class to 15-seaters and another to 2-seaters has been cut out, and that designers will be given reasonable latitude.

Several members of the P

Several members of the Royal family will, it is said, attend the opening of the competitions at Martlesham Heath in June.

Flight to South Pole

A new expedition to the South Pole is to leave London in June next in the Terra Nova, the famous ship in which Captain Scott set out on his last voyage. An aeroplane will be taken, and it is intended to fly over the Great Ice Barrier, which contains peaks over 12,000 feet high, to the Pole.

#### Flier and Vulture Battle 1,000 Feet Up

Moulmain, Burma.—Lieutenant Etienne Poulet, the Frenchman who recently yielded the Paris-Australia air race to Captain Ross Smith, is safe here, following a battle in the air with a huge vulture, which broke a propeller of his machine and forced him to land on a small plateau in the mountains.

Lieutenant Poulet left Bangkok, Siam, on December 6, two hours after Captain Smith, and direct word of his fate had been lacking until last night, when he landed here in his machine.

The French aviator said he noticed the big bird while flying at an altitude of 1,000 feet over mountain peaks in Siam, about one hundred miles east of Moulmain. The vulture circled for a time over the aircraft, which was making little speed because of weather conditions, then dived straight downward, striking and shattering the right propeller.

#### 10,000 Feet in Two Minutes

The Daily Mail says that General Seely's resignation has come at a moment when important new developments in aeroplane construction are likely as a result of experiments now being carried out.

They may provide the means sought by inventors which will enable an airman to "furl the sails" of his machine to some extent while in flight. The higher the speed attained the less is the spread of wings required to carry a given load. On the other hand, the greater the wing spread the greater the air resistance and the more power required to overcome it. If a device can be perfected by which an airman can reduce the extent of his planes while in full flight, the pilot of the future may "take in a reef" like the old-time mariner, and so gain another 20 miles or so an hour.

This is not the only new wonder of the air. Last week a new British machine succeeded in rising 10,000 feet in two minutes. According to an eye-witness, "it seemed to stand on its tail and shoot into the air like a rocket." The Admiralty have also been perfecting a new type of seaplane, each of which carries two 15-inch torpedoes and is capable, when flying low, of sinking a £3,000,000 Dreadnought.

#### Aerial Signposts

Aerial Signposts

The official recommendations which were issued some time ago as to the desirability of indicating main-line stations for enabling passing airmen to verify their positions, seem to be bearing fruit. According to a "Notice to Airmen" issued by the Air Ministry, the roofs of the stations at Redhill, Tonbridge, Ashford (Kent), and Hitchin have now been marked with their names in large white letters. This is very much of a move in the right direction, and it is to be hoped, now that the railway companies are able to start seriously on the renovation of their large stations, that all the principal points along the main railway routes may soon be indicated in a similar manner. We say advisedly the principal points, for the reason that confusion might easily arise if the sign-posting idea were carried to too great a length.

#### To Paris in 99 Minutes

To Paris in 99 Minutes

An astonishingly fast flight to Paris, which establishes a speed record for the Airco air-mail service, was accomplished on December 19 by Lieutenant Powell. Leaving Hounslow at 12.41 p. m. in an Airco 9 biplane, with a passenger, eight bags of G. P. O. mails, and 220 lb. of express parcels, Lieutenant Powell flew the seventy miles between Hounslow and Lympne in twenty-five minutes, attaining a speed of 168 miles an hour.

Alighting at Lympne at 1.05 p. m. to set down his passenger, he was in the air again at 1.10 p. m., and flew the 180 miles between Lympne and Le Bourget in another sixty-nine minutes, averaging on this second stage a speed of 154 miles an hour. He actually alighted at Le Bourget at 2.20 p. m., having made his journey from London to Paris, with a halt en route, in only ninety-nine minutes, at an average speed throughout of 158 miles an hour.

#### Handley Page Services

Handley Page Services

On the London-Paris Air Service, between September 2 and December 17, 612 passengers and 13,601 lbs. of freight have been carried over a distance of 33,350 miles. The weather over the Channel has been extremely bad for flying recently, and although gales and rain have not seriously interfered with the air service, fog and mist on several days have kept the aeroplanes confined to their sheds.

On the London-Brussels service, between September 26 and December 17, 244 passengers and 25,249 lbs. of freight have been carried over a distance of 18,380 miles.

#### Australian Air Mails

A company has been organized to establish aeroplane passenger services between Melbourne, Hobart, Adelaide, Perth, Sydney, and New Zealand, and expects to commence operations by July next with 10 machines of about three tons capacity. A daily service from Melbourne to Hobart, Adelaide and Sydney is contemplated, the trips to occupy 7 hours, 6 hours and 6½ hours respectively. The fares will be approximately £5 per journey and freight 8d. per lb.

#### Tasmania Air Mail

Lieut. Long flew across the Bass Straits in an Alliance aeroplane on December 15, from Tasmania. He is the first to accomplish the feat. A few hours later a Sopwith arrived across the Straits from Melbourne. Thus started the first air mail with the Commonwealth.

#### Civil Aviation in India

Civil Aviation in India

It is understood that the Government of India have decided that the development of Civil Aviation in India will in so far as mails are concerned best be attained by granting a monopoly for the carriage of mails throughout India to a single Air Transport Company, which will not be linked with any aircraft manufacturing company. The monopoly will be limited to the carriage of mails, the postal rates for which will be fixed by the Government of India.

In fixing rates for the carriage of goods other than mails and for the carriage of passengers, the Company operating the mail monopoly will have a free hand in open competition with any other companies which may be established for such traffic.



# ELEMENTARY AERONAUTICS

## MODEL NOTES

By John F. McMahon monopol -- A -- mainada



#### Another Motorcycle Engined Aeroplane

The accompanying drawing shows a motorcycle engined monoplane designed and built by John H. De Mott of the Sheepshead Bay section of Brooklyn. Mr. De Mott is well up on aeronautics as he has followed the game since the old field was opposite the Fair grounds at Mineola, L. I. He has had three years experience with foreign machines such as the Nieuport, Spad, Sopwith Camel, Breguet, Fokker and in fact most of the prominent scouts and bombers used by the

advanced squadrons.

advanced squadrons.

It is a well known fact that the French and Germans were rather daring in using extremely light parts in building their machines in order to get the most out of their planes, though the parts were strong in spite of their size. The French maintain that a light machine built up of rather small parts stands a better chance than one built heavier for the frailer type machine can right itself after a rough landing while the heavier one will fracture. Mr. De Mott ascertained this while on the other side and when the writer examined the machine, he was astonished to find such a light machine with such comparatively strong parts. The fuselage is solid—and is light enough to be lifted with one hand, wheels, landing chasis and all such parts included. The machine is original in design as are the details of control, body construction etc. These facts along with its graceful lines and efficient surfaces insure its success. The plane is very nearly complete, needing only a few finishing touches which will soon be under way. Further reports regarding tests will be given later. It might be added that Mr. Mott will be associated with the Modiford Aero Company and should be a valuable asset through his Aero Company and should be a valuable asset through his knowledge of American and foreign construction. We will await the trials of his machine with interest. The specification are as follows:

operation among the members. This was due primarily to the lack of a definite system upon which to work, and in a few instances to the lack of an energetic secretary. So many clubs were content to adhere to the "flying stick," rather than to launch out into a more technical sphere, such as the construction of engine-driven machines, scale models, full-size gliders, and so forth. Again, many of such members (especially so with regard to the London and District clubs) were mere "pot hunters," striving to make as much out of the hobby as possible. I certainly think that the K. M. A. A. should arrange a programme of competitions on such A. A. should arrange a programme of competitions on such a basis that provincial clubs should have an equal advantage in competing. I much commend the competition held in America a few years back, in which clubs from all parts could compete without having the expense of a lengthy journey, as is the case in England, where, say, a Manchester competitor must travel to the London district in order to compete.

I am in favor of all provincial clubs affiliating to the K. M. A. A., which is the paramount body to govern model aeroplaning in England, but I certainly think justice should be

done to them in the matter of competition.

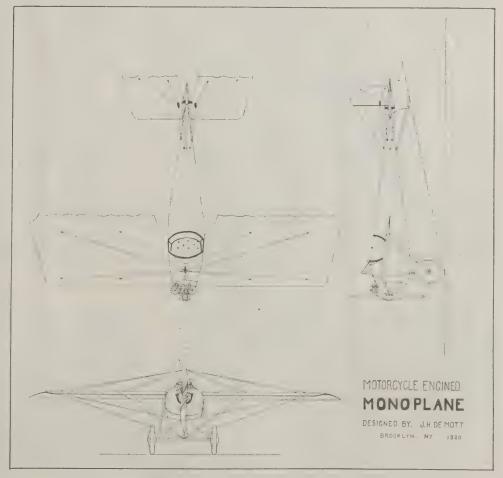
Returning to the question of the clubs themselves, I personally think that too much was attempted commensurate with the subscription paid per member. In many instances the fee was as low as 1s. per quarter—4s. a year per member! What curriculum of reasonable pretensions could be arranged with this figure, assuming a membership of twenty-four? It is by far the better plan to have a yearly subscription of at least 30s. per member for a membership of twelve, and also a weekly subscription of 6d.

(To be continued)

Span	22	ft.
Length	14	ft.
Chord	5	ft.
Surface110		
Stabilizer 24	sq.	ft.
Rubber 6		
Weight, empty 2	25 1	bs.
Weight, 2 hrs. fuel 4		
Speed	Λ.P.	Η.
Wing curveBreguet (mod	difie	(d)

#### Running a Model Aero Club By F. J. Camm Model Editor "Flight"

With the cessation of hostilities and the consequent demobiliza-tion, many old aero enthusiasts will return to civil life, and, judging from the correspondence re-ceived during the war from memflown models almost "in the cannon's mouth"), there is every indication that model aeroplaning will assume a status compared to will assume a status compared to which pre-war times will pale into insignificance. There are also many who, having been, figuratively speaking, thrown into contact with aeroplanes, have become model enthusiasts during the war, and will continue as such now that the "piping times of peace" are in reality with us again. Before the war there did not appear to be any particular not appear to be any particular collation of effort on the part of enthusiasts residing in the same district. True, there were many provincial model aero clubs, but when one examined their modus operandi, one found a lack of co-





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Trailmen of the Air

The Northwest Mounted Police may use airplanes in their work of running down fugitives from justice.—News note.

Over the pines, where we used to go under, And the world all white below, With the eagle watching our flight in wonder, On the lawbreaker's trail we go; Thief of a Creo, with a sledful of takings,

Frenchy, who murdered a pard; They and their kind are our combings and rakings Since the aeroplane crew stands guard.

Over the plains, where we plodded long hours
To the squeak of the snowshoe thongs.
Now we look down, as from sky-piercing towers,
While the motor is droning its songs.
Weary the miles that we made in the saddle; Short are those miles to-day And yet for the pony, the sled and the paddle We long as we wing our way.

ARTHUR CHAPMAN.



MOST ANNOYING!

To do a good turn for a pilot and get in the way of the propeller -Courtesy Flight

The aviator's wife was in tears. "What's the matter, my dear?" asked her friend.
"I'm worrying about George," she said. "He's been trying for a week to kill our cat, and as a last resort he took pussy up in his plane. He said he would take her up 2,000 feet and drop her over."

"Well, there's nothing to worry about," said her friend. "Oh, yes there is," said the frantic woman. "George isn't home yet and pussy is."—Johannesburg Star.

#### Oh, Shades of Shakespeare! The Cat's Come Back

Mcthusaleh—When is a plane not a plane? Father Time—When it's aloft. -The Hook.

#### His Second Ride

Pilot—Have you ever been up before? Passenger—One short stretch at Blackwell's Island.

#### Speaking of Left-Handed Monkey Wrenches

Did you ever try to buy a quart of propeller wash? Have you a pair of the latest tail-skid chains? Always use a tuning fork when you come to tune your

-Pacific Aeronautics.

#### You Know How It Must Have Been

A fellow who had ne'er been up Was anxious for aeroplane rides, And yet a gone feel in his middle Made him fear that he lacked the insides. But fear nc'er kept him down.

But when he got up in the air With loops, turns, dips and some glides A dull sick feel in his middle Made his fear for his weakling insides. But fear ne'er kept that down.

#### The Airman "Demobbed"

I rode on the storm and the lightning, And raced the gay clouds as I flew, Dipped under the arch of the rainbow, And swung like a star in the blue.

I slid down the path of the sunbeams.

And swooped like a gull to the wave;
I dropped o'er the crests of the mountains,

Down the streams that the valleys gave.

Now my feet are laden and earthbound, And I know why the caged bird dies; For my soul leaps out to the blue ways, When I dare look up at the skies! -C. H., Lt., R.A.F.

#### More Brains Than Brass

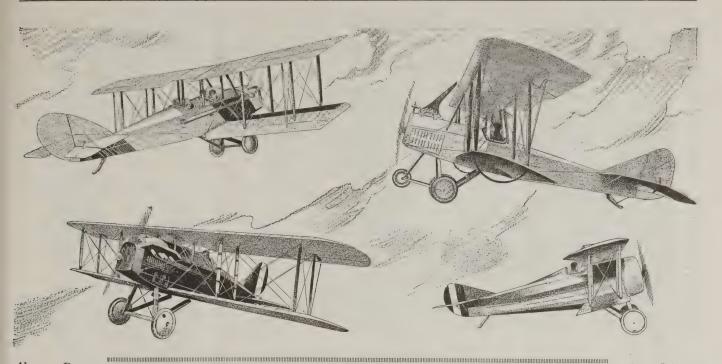
Connoisseurs in the art of advertisement writing, whose name is legion nowadays, may be interested in the following extract from the New York Journal of Commerce:—

A young Man (capital M), 26 Years old, and going to rot in a big concern, has been so appreciated that he is overpaid

for the work he does; he has just realized it, and wants to get in a place not made for a genius but for a man with 8 years' experience and 4 years' real, real responsibility; he won't move the earth, but he will help move goods from dealer to consumer, and the employer who wants new blood and more consistent brainwork than brass will answer this ad; it only appears once. Address, &c.

If, as he states, the advertiser possesses more brains than

brass, he should prove an invaluable employee.—The Jovstick.



Below—Single Seater Pursuit Scout Type "D"

#### AIRCRAFT DEPARTMENT ORDNANCE ENGINEERING CORPORATION (EQUITABLE BUILDING) 120 BROADWAY, N. Y.

Above—Primary Training Aero-plane Type "A" Below — Single Seater Pursuit FighterType "B"

Valentine & Company, New York City.

January 2, 1920.

You may be interested in the fact that VALSPAR is used on our "Type D" Pursuit Fighter, one of the fastest aeroplanes in the world. Official Government reports accredit this single-seater with a speed of 147 miles an hour, and it has been adopted as a standardized design for the United States Army Air Service.

VALSPAR is used on all Ordnance Aeroplanes - the "Type A" 105 H. P. two-seater side-by-side Primary Training Plane, built in 1916; the "Type B" 160 H. P. Pursuit Fighter; the "Type C" 80 H. P. Advanced Training Plane and the "Type D" 300 H. P. Pursuit Fighter.

After the successful use of VALSPAR on all our Military planes it is natural that we should include it in the specifications for our Commercial acorplanes, the first of which is nearing completion - the "Type F" 150 H. P. fourpassenger Tourist aeroplane.

> Yours very trul Chief Engineer



#### VALENTINE & COMPANY

Largest Manufacturers of High-grade Varnishes in the World ESTABLISHED 1832

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# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington	350	miles
		miles
Washington to Macon and return Washington to Dayton and return		
(two times) Washington to Langley Field and	1000	miles
return	. 400	miles

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

# The Glenn L. Martin Company

Contractors to the U.S. Army, Navy and Post Office Departments,

FIRST IN WAR

FIRST IN PEACE

### Quality Tells in the Long Pioneering Flights

# THE HOME INSURANCE NEW YORK

ELBRIDGE G. SNOW, President

Home Office: 56 Cedar Street, New York

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AGAINST THE FOLLOWING RISKS

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- 2. THEFT (Of the machine or any of its parts).
- 3. COLLISION (Damage sustained to the plane itself).
- 4. PROPERTY DAMAGE (Damage to the property of others).

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—Demonstration Permit—Instruction Permit

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Aircraft, Automobile, Fire and Lightning, Explosion, Hail, Marine (Inland and Ocean), Parcel Post, Profits and Commissions, Registered Mail, Rents, Rental Values, Riot and Civil Commotion, Sprinkler Leakage, Tourists' Baggage, Use and Occupancy, Windstorm.

STRENGTH

REPUTATION

**SERVICE** 



(Continued from page 596)

Under date of January 20th, Pilot Farr Nutter, United States Air Mail Service, reports to Superintendent McGrath of his Division, as follows:

"Ship No. 106 was flown to Chicago by the writer, January 15, 1920, and landed in Grant Park. Shortly after leaving Bryan, Ohio, ship flew into cold rain and snow, result, ship collected ice during balance of trip and became very heavy. Was required to fly ship in stalled position to maintain altitude with motor fully open.

"Over Gary, Indiana, the ship suddenly began vibrating, indicating that some brace wire had broken. Motor functioned perfectly. Continued flight to station and was landing at high speed (70-80 miles). Leveled off at 15 feet, cut motor, ship dropped, landed on three points. Broke two shock absorbers and four longerons. This damage was unavoidable due to weakened fuselage before landing, and overloaded ship with ice."

The plane clearly dropped like a plummet on leveling off for the landing on the slowing down of the motor.

Under date of January 21, Pilot Clayton W. Stoner of the Air Mail Service reported on his flight and forced landings January 16, 1920, between Chicago and Cleveland, saying:

"The day was very damp and misty, and the mist froze to the wires and struts as fast as it struck. The wires soon became coated, the struts the same, the airspeed indicator filled with ice, and the machine finally refused to stay in the air with the motor turning over with maximum speed. I landed at a place near North Liberty, Ind., and kicked ice off plane. I took off and as before the ice

formed on the machine again and forced me down at a place near Millersburg, Ind."

Nature takes care of this condition in birds, and aeroplane designers and manufacturers should chalk this down as a point to consider when designing or building commercial aircraft for regular and dependable transportation.

#### Aviator Buys New Planes

Saskatoon, Can.—Lieut. H. S. McClelland, R. A. F., Western Canada's pioneer commercial aviation promoter, has returned from a trip to Toronto, Detroit and other Eastern points, where he made arrangements for expansion of his flying business in 1920. The aviator purchased one new Curtiss JN-4 biplane and is now bargaining for a DeHaviland-4. McClelland made more than 300 successful passenger flights here last summer, in addition to many long cross-country jaunts and stunt exhibitions.

#### Cadet Training Started — Class Room Instruction Under Way

With the arrival from Eberts Field, Lonoke, Arkansas, of 16 cadets, the detachment at March Field is now complete. Fully a hundred are enrolled in the first class of "former enlisted men" now well on their way to commissions in the reserve corps. Class room instruction has already begun.

Organization of the Cadet Detachment brings the personnel of the field close to 700. Major Peabody, commandant of the detachment, has the organization well effected. Officers of the flying detachment are speeding up preparations for "first dual" instruction, and in general March Field will soon take on an aspect much similar to that of war times, in so far as training is concerned.

Ground instruction as previously obtained at various universities during the war is now being carried on in the class rooms here. Competent instructors are in charge of each subject including radio, rigging, motors, ignition, carburetion, meteorology, photography, aerial observation, machine gunnery and numerous other kindred studies. By many the application of theory of flight along with practical aerial instruction, such as can be administered at this field, is believed much superior to the old method when theory and practical aviation were studied in separate schools.

Some few of the men in the cadet detachment have already had a number of hours of instruction. These men will doubtless go ahead rapidly. Major Clark is now picking out his corps of instructors, among whom are several overseas pilots and some of the best aviators in the army. Instead of the old "Jennies" used in training a year or so ago, the Curtiss ships propelled by Hispano-Suiza motors will be used. Advanced instruction will be given on scouts and DeHaviland Fours.

#### Air Patrol Flies Despite Zero Mark

Hempstead.—Regardless of flying in a temperature well below the zero point, the regular patrol flights of aeroplanes between Mitchel Field, at Garden City, and Langley, Virginia, were commenced January 15. The first De Haviland made the trip from Virginia in two hours and fifty-five minutes, cutting through the air at a clip around 160 miles an hour. Lieutenant R. E. Davis was the pilot. His observer was Lieutenant J. M. Single.

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# HIGHEST SAFETY FACTORS TWO-SEATER BIPLANE LOWEST UPKEEP COST

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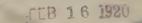
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BRANCH OFFICE:
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# WEEKLY

Vol. 10, No. 17

FEBRUARY 9, 1920



A Remarkable Aerial View of the Hell Gate Bridge

Why Congress Refuses to Give Additional Appropriations for Aeronautics



A most careful, painstaking, rigid inspection follows each step in the process of manufacture at our plant from the WALNUT log on through each and every operation until it becomes a completed airplane propeller.

This is one reason why propellers from Piqua proved so dependable during the war.

We now maintain the same rigidity of inspection in our plant that we had during the war period. You can DEPEND on Hartzell Propellers being properly designed and well manufactured. Our exceptional facilities for quantity production are available to those airplane manufacturers who are looking for a good honest propeller that will hold up under hard service.

Our Engineering Department is at your service.

Hartzell Walnut Propeller Co.

PIQUA, OHIO, U. S. A.





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# THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

Published Weekly by THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., February 9, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, FEBRUARY 9, 1920

NO. 17

# CIVILIAN DEMAND LARGE ENOUGH TO ABSORB SURPLUS GOVERNMENT AEROPLANES AND KEEP MANUFACTURERS BUSY

HAT civilian demand will be large enough this year to absorb the surplus government aeroplanes and keep manufacturers busy is evident from recent developments, which show that the civilian demand is even more extensive than was stated in the report of the Commission of the Aero America and the Aerial League of America which

Club of America and the Aerial League of America which toured the United States and investigated aeronautic interest in forty-nine (49) cities.

For instance: An Air Service News Letter dated February 2nd, quotes J. I. Calloway of the Goodyear Tire & Rubber Company, who has just returned from a lecture tour of 16 cities, as finding that there are over 320 aeroplanes in use in the State of Nebraska. This is ten times larger than reported by the Commission of the Aero Club of America and the Aerial League of America. Mr. Calloway is also quoted as saying that Chicago has nearly 300 planes in use. Other receivilian purchases of aircraft and aeronautic activities not civilian purchases of aircraft and aeronautic activities not mentioned in the report of the Commission are given in an Air Service Letter, dated January 19th, which reads as follows:

"We are not willing to admit that the aircraft industry in America is entirely dead. It is absolutely true that after war activities ceased a post mortem was held over the corpse of aviation and it was promptly interred peacefully thru the ages to come, but fortunately a few of the mourners who followed the procession believed that the corpse of aviation was only in a transitory period of suspended animation and have exhumed the body; already it is showing signs of life.

"To prove the above statement that strides are being made in this country in spite of the difficulties that have been placed in the way of aviation a few facts that are recalled are

quoted offhand:

"In June, 1919, a corporation was formed of ex-aviators who were temporarily on duty at Langley Field, Hampton, Virginia. This company was organized primarily as a mapping concern although in its original prospectus it was the intention to transport passengers as well. At the present time it is understood that this corporation has more mapping contracts on hand than can be filled throughout the year.

"On the Pacific Coast the Mercury Aviation Company which

has been organized almost a year has been doing a passenger has been organized almost a year has been doing a passenger carrying business out of Los Angeles to nearby cities and apparently has no intention whatever of quitting. The Service Aviation, Training and Transportation Company, Wabash, Indiana are also operating passenger carrying ships between the states of Texas and Oklahoma. The Chaplin Airplane Service operates eight triple motored aeroplanes between Los Angeles, San Francisco and San Diego.

"Now let us turn our attention for a few minutes to the

"Now let us turn our attention for a few minutes to the Aeronautical Exposition being held in Chicago at the present time. We read that E. J. Johnson, of the Aero Transportation Company of Denver, Colorado, purchased 500 ships to be used in connection with sight seeing passenger carrying; J. B. Humphries, another western man, purchased six ships; B. I. Brookins, of Tulsa, Oklahoma, purchased 447 ships for which the latter paid \$2,500,000 and in addition a number of small sales of one or two ships were made to individuals. Certainly these buyers are not purchasing ships and spending good money for pleasure purposes. It is a purely business proposition and their intentions are to operate their lines for

Most important is the fact that two hundred of the planes ordered by Mr. B. I. Brookins, the president of the Southwest Airplane Co., of Tulsa, Oklahoma, are latest type three passenger touring aeroplanes and "Seagull" type flying boats, which sell at prices ranging from \$9,800 to \$12,000 each. Other sales are for eight passenger "Eagles", which sell at along to \$40,000 each. close to \$40,000 each!

close to \$40,000 each!

That only the surface of possible sales has been scratched was pointed out by the commission and Mr. Calloway is quoted in the Air Service letter as follows:

"Hundreds of business men and former military aeronauts heard Mr. Calloway speak before Aero Clubs and Chambers of Commerce and by their eager questions showed that a deep sentiment toward the future of aerial transportation existed.

"At every turn Mr. Calloway was besieged by former service men with the query as to how they could put into practical use the experience received in the recent war and evidenced great interest in the future of dirigibles for passenger and freight transportation."

# WHY CONGRESS REFUSES TO GIVE ADDITIONAL APPROPRIATIONS FOR AERONAUTICS

"Pernicious Lobbying" of Some Members and Employees of Manufacturers Aircraft Association Charged—Dissolution of Association Expected

ERIAL AGE this week is forced by compelling duty to deviate from its usual policy of not printing anything about alleged shortcomings of organizations and individuals. Afrial Age since its inception has been conducting a national campaign of education for the upbuilding of aeronautics, and especially for the healthy growth of the aeronautic industry. In the discharge of its duties as the national

technical, engineering and trade authority in the aeronautic field, AERIAL Age has often had to urge Congress to consider and support certain constructive aeronautic policies, and at times found it necessary to criticize certain members of Con-gress for their opposing appropriations for the upbuilding of the Air Service and the Aerial Mail Service.

Congress as a whole never failed to give our suggestions

due and careful consideration and the records show that it granted all the aeronautic appropriations urged in 1915, 1916, 1917, 1918 and 1919, which amounted to the vast sum of \$2,000,000,000!

But during the past six months Congress has refused to grant additional appropriations and recently refused a small appropriation for the Aerial Mail Service. Aerial Age inquired into the inner causes of this apparently hostile attitude towards aeronautics and promised members of Congress to consider their viewpoints from the standpoint of national welfare and to print the results of the outcome, giving their viewpoints as well as the viewpoints of those who are fostering the development of American aeronautics and are urging appropriations for purely patriotic reasons.

We had not gone far into this investigation before we were confronted with a mass of evidence proving conclusively that something radically wrong has existed and may still exist in the aeronautic industry, which will compel fair-minded people to agree that Congress is justified in its wanting to investigate

the situation before giving further appropriations.

# Congressmen Are Fair and Tolerant

The aeronautic files of congressmen, like the files of the editors of newspapers and trade journals, have been flooded in the past three years with communications from organizations and individuals making known their own achievements, plans and aims; and also of communications which people and organizations write to make known alleged shortcomings and

Generally speaking, neither congressmen nor editors are influenced by such communications and only pay notice when there is clear evidence that an issue is involved which affects one or more phases of national welfare. Congressmen are forced daily by lack of time, and editors by lack of space, to eliminate, first, the less important things for more important things; second, the destructive for the constructive; third, the

When dealing with the actions of individuals and organizations, the prevailing policy is usually to give the benefit of the doubt to everybody, but to let those who accuse others prove that they have done as much for general welfare or progress as those whom they accuse, unless there is clear evidence that the written or unwritten laws which govern the affairs of men have been violated by the accused.

Mistakes and actions due to what is generally implied as "bad judgment" are usually excused, and press agent "boastings" are received with more than passing interest, the general tendency being to want to know what men and organizations think of themselves and how they estimate the value of their work and how far-reaching their plans and aims are.

# Alleged Lobbying, Coercion and Trade Restraint Practice of Few Employees and Members of Manufacturers Aircraft Association Seems to Be Main Cause of Trouble

Deplorable activities which appear to be the work of a few individuals, mostly employees and members of the Manufacturers Aircraft Association, seem to be the main cause of trouble. But the mass of evidence is voluminous and the charges many-sided, and various members of Congress have different views and have reached different conclusions regarding the situation.

For the fourth time within eight months, Congress has refused to grant appropriations for aeronautics. The first refusals affected Army and Navy aeronautics; the last refusal affects the Aerial Mail Service.

Congressmen state that so long as Congress is too busy to conduct another aircraft investigation, it may continue to refuse aeronautic appropriations, unless steps are taken to stop the "obnoxious activities of lobbyists," and steps are taken to make the aeronautic industry a helpful national

institution, as it should be.

"A scheme to get unfair government subsidies is behind this pernicious lobbying" states a congressman who believes that the situation justifies a congressional investigation to determine the extent in which the public funds paid by the Government to the Manufacturers Aircraft Association for patent royalties on military and naval aeroplanes are being used in lobbying, and sees evidence of campaigning against congressmen who can be congressed to the congressment of the congressment who congressment is a congressment of the congressment o congressmen who oppose their lobbying, as well as efforts to have "surplus" military aeroplanes destroyed, spreading unfounded propaganda about aeronautic appropriations of other countries and the aeronautic situation in America and abroad attempts to hurt the business and reputation of aircraft firms and individuals not allied with the schemers, trade restraint practice, direct attempts to stop or delay the progress of civilian flying activities, objectional coercions, and other similar activities which are decidedly against the best public interests.

# Recent Lobbying Brings Forth Old Charges of Profiteering and Senate Condemnation of Aircraft Manufacturers Association

The charges against the lobbyists are numerous in number and character and it is evident that recent activities of the and character and it is evident that recent activities of the men accused of lobbying have brought forth the old charges and evils discovered in the Congressional investigations of 1917-1918, which led the Senate Aircraft Investigation Committee to condemn the Manufacturers Aircraft Association and its methods as "vicious and designed to reap large profits by taking advantage of the Government."

On investigating the connections of the men who have been conducting the "pernicious lobbying" complained of, congressmen find that these men are employees and members of the Manufacturers Aircraft Association. It is not surprising, therefore, that congressmen hold the old charges of profiteering, restraint of trade, etc., against the present lobbyists, and insist that the Association must be dissolved, and are not inclined to give additional appropriations for aeronautic purposes so long as the requests for appropriations seem to be

inspired by the Association.

Congress, during the war, allowed appropriations for aeronautics amounting to \$1,672,000,000 without asking questions. In the investigation of the expenditures of this huge sum, the Senate investigated the Manufacturers Aircraft Association and its methods and condemed them as "vicious and designed to reap large profits by taking advantage of the necessities of the Government." It was recommended that the Association dissolve.

Now Congress finds that not only the Association has not dissolved, but some of its employees and members are conducting what congressmen characterize as "pernicious lobbying to get unfair and unwarranted subsidies."

As a congressman points out, it must be said in justice of the Congress that it has had a most sympathetic attitude towards aeronautics and the aeronautic industry which is evident from the fact that the sum of \$1,672,000,000 was granted during the war, without questions or conditions as to its use. Congressmen have also given the Manufacturers Aircraft Association the benefit of the doubt many times in the past two years, but, it is stated, cannot do so any longer without disregarding their duties as representatives of the people and as American citizens.

# Lobbying Appears To Be Work of Few Individuals and Is Condemned by Leading Aircraft Manufacturers

It is well to state right here that it is evident that the recent lobbying is the work of a few individuals and is condemned by leading aircraft manufacturers, including prominent members of the Manufacturers Aircraft Association, like the Curtiss Company, who are reported to be absolutely against government subsidies and find civilian business so substantial

government subsidies and find civilian business so substantial that they work day and night to fill their orders.

It would be unfair, therefore, to accuse either the aeronautic industry or all the members of the Manufacturers Aircraft Association of being responsible for the present trouble.

A number of manufacturers suffered from the strenuous efforts made by the lobbyists to prove that there was no demand for aircraft for civilian and commercial purposes. To quote a few of the many cases: when an engineer or a draughtsman left the Curtiss Company the fact was heralded and twisted to serve as evidence that the Curtiss Company was unable to get civilian orders and was dismissing its staff. As a matter of fact the Curtiss Company was working day and night to fill orders. When the Martin bomber, and the Lawson air-line ran into difficulties in flying across country, due to bad landing places, the incidents were circulated as arguments to prove that aeroplanes were not sufficiently developed for civilian use. Hence, one was told, the Government should subsidize manufacturers and pay for further experiments.

#### Attempt to Have Aeroplanes, Motors and Aircraft Materials Worth \$1,000,000,000 Scrapped Aroused Congress' Suspicions

During the war Congress appropriated \$1,672,000,000 for During the war Congress appropriated \$1,672,000,000 for Army aeronautics, as follows: \$640,000,000 in 1917 and \$1,032,000,000 for the year ending June 30, 1919. \$31,846,000 had been appropriated by the Act of June 15, 1917, and \$10,800,000 by the Act of May 12, 1917. Unfortunately only a few aeroplanes and motors were sent overseas and it will be recalled that through the second year of the war, and after the signing of the Armistice, the Congress and public were presented many reports intended to prove that the huge aeronautic appropriations were efficiently spent. According to these reports, at the time of the signing of the Armistice the United States Army, was producing most efficient aeronautical properties aeronautical productions. the United States Army was producing most efficient aeroplanes and motors and the production of these was to increase and the peak of production was to be reached in 1919, and in

623

the campaigns of 1920 American aircraft, it was stated, would

literally have smothered the enemy.

The satisfaction of knowing that victory would have been assured by our large production of planes was all that the country could get in return for the vast sums spent. As the Army and Navy were reported to have about fifteen thousand aeroplanes, close to twenty thousand motors, hundreds of balloons, and millions of feet of aircraft lumber, aeroplane and balloon cloth and tens of thousands of instruments and consistent Courses the course that the Army and Navier the Course of the course of the course to the course of the course o equipment, Congress felt certain that the Army and Navy would not need appropriations for equipment for some time As one congressman points out, production of certain types of aeroplanes and motors continued for several months after the signing of the Armistice, and it was taken for granted that they were the very best types and our Army and Navy air forces in peace time would have a huge reserve of the very best aircraft, motors, balloons and equipment.

Congressmen were amazed, therefore, when statements were made and circulated to the effect that the aeroplanes and equipment on hand were obselete and whose Congress gave.

made and circulated to the effect that the aeroplanes and equipment on hand were obsolete and unless Congress gave additional appropriations besides the \$25,000,000 allowed for the year ending June 30, 1920, the U. S. Army aero squadrons at the Mexican border would be inferior to the Mexican Air Service! Congressmen asked the War Department for information regarding the status of the Mexican Air Service and the Department reported that it consisted of six planes equipped with motors of 150 h.p. and twelve equipped with motors of 100 h.p.

motors of 100 h.p.

Congress and the country had been told that the aeroplanes machines in production for 1919-1920 and were intended for overseas service, to be used to win the war! But the country now was asked to believe that these same machines were not good enough for peace time service and ten thousand of them were not equal to Mexico's twenty low-powered training aeroplanes!

If conditions were as reported, if it was true that these aeroplanes which were intended for use in 1919 and 1920 to win the war, were obsolete for peace purposes, then if the war had continued they would also have been obsolete for war purposes—and the American Air Forces would have been crippled by lack of efficient machines, and the two million American soldiers on the field would have been in danger from unpreventable enemy air attacks—and other horrible disasters could be conceived.

It was unconceivable that such a monstrous crime had been committed against the nation. The alternative was to find the purpose of those spreading such reports. At this time some members of the Manufacturers Aircraft Association were also urging the government to subsidize aircraft manufacturers, and that pointed to the obvious conclusion that these state-ments and the grossly exaggerated reports regarding the aeronautic appropriations of other countries were the work of lobbyists.

# Statements of Manufacturers Before the Frear Investigating Committee and Aviation Subcommittee Convinced Congressmen that "Pernicious Lobbying" Was Going On

Some statements made by manufacturers before the Frear Investigating Committee and the House Aviation Subcommittee convinced congressmen that "permicious lobbying" was going on and they had opportunity to follow the work of the

lobbyists.

Congressmen have at hand the information collected during the aircraft investigations and are in a position to find out the approximate amount of profits made by manufacturers during the war, the amounts they received in the liquidation of gov-ernment contracts, and the size of claims still pending. Also to find out whether those who are spending substantial sums in lobbying for government subsidies are making efforts to get civilian business or not, and what the possible ultimate

object of lobbying is.

The following case is quoted by a congressman: a manufacturer, member of the Manufacturers Aircraft Association, who had done government business amounting to over \$15,000,000 and had made good size profits, gave the Committee gloomy reports about the possible civilian demand and immediate development of American aeronautics. The committee gloomy reports about the possible civilian demand and immediate development of American aeronautics. The committee gloomy reports a possible to hear that and to find that this firm mittee was surprised to hear that and to find that this firm was not doing anything to develop civilian business. A few days later they learned that this man's firm was seeking to liquidate its stock at a fraction of what the stockholders had originally paid for it, and a new company was under organization. Arguments were subsequently presented in favor of government subsidies in the guise of orders "to keep the factories going" and the new company was one of the manufacturers mentioned as needing subsidies. This firm is also one of the beneficiaries under the cross-licensing agreement of the M. A. A.

It is submitted that, with the most charitable attitude of mind towards this transaction, congressmen could only reach one conclusion in this case, and while not being obliged to consider the complaints of displeased stockholders who lost in the liquidation of the first corporation, they are duty bound to investigate before they allow the Government to pay any further public funds to this concern, especially for subsidies.

# Statements Circulated by M. A. A. Were Incorrect

At about the time the above was happening, statements were issued to the press by representatives of the Manufacturers Aircraft Association and widely circulated, one of which read as follows:

"Great Britain has appropriated \$330,000,000 and France \$220,000,000 for aviation. It is understood that Japan has appropriated in excess of \$200,000,000."

The statement concluded with a gloomy description of the inability on the part of certain manufacturers, whose names were quoted, to continue manufacturing unless Congress

allowed appropriations.

As the names quoted were mostly names of manufacturers who started with small investments and had grown entirely on government war contracts, and had figured in the aircraft investigation, and several were accused of alleged profiteering during the war and in liquidating government contracts, the statements were challenged and investigated. It was found that Great Britain's air program had been cut down greatly that Great Britain's air program had been cut down greatly and the combined appropriations asked for military, naval and civilian aeronautic activities for Great Britain and the expeditionary forces, including the cost of establishing new aerodromes in India, Egypt, Mesopotamia, and other colonies, amounted to only fifteen million pounds, or seventy-five million pounds, or seventy-five million pounds. lion dollars in normal exchange conditions.

The American press had printed dispatches to this effect, As early as September American papers printed announce-ments of the cessation of work on British Government airships under construction and statements regarding the cutting down of the British air program, made in the House of Lords and House of Commons had been published in British and

American publications.

These included the statements made by Lord Churchill and Major General Seely in October to the effect that 252 British Military Aero Stations had been given up to cultivation since the signing of the Armistice and only four rigid dirigibles were left in the air service of which only the R-34 was to be kept, the R-38 was to be taken over by the United States Navy and the other two, the R-32 and R-33, were to be sold

to private interests.

The French Air Service has also been cut down to a fraction of its former size. The Japanese Air Service is not spending

National economy forced those countries to cut down to a minimum, notwithstanding the fact that peace had not yet been signed and the Russian and Balkan situations were alarming.

Once more the work of the lobbyist was obvious-and Congress refused the additional appropriations requested.

#### Agent of Manufacturers Aircraft Association in Washington Sought to Prevent Civilian Flying Activities

Following is one of the cases known to congressmen of

attempts to suppress civilian aeronautic activities:

Last summer a prominent sportsman who was a ranking officer in the Army Air Service offered a trophy to stimulate civilian aeronautic activities and in offering the trophy stated that civilian aeronautic interest was becoming substantial and that extensive activities would begin as soon as aeroplanes could be obtained.

This officer lived in Washington, but one day while visiting in New York he telephoned to his secretary in Washington and was surprised to learn that there was a note from a representative of the Manufacturers Aircraft Association, asking for an interview. He mentioned the matter to other sportsmen, inquiring who this man was and the possible nature of his visit. The suggestion was made that he probably had machines for sale and the interview was granted.

To the sportsman's amazement the representative of the Manufacturers Aircraft Association stated to him the advisability of not starting civilian aeronautic activities at that time because, he said, it would upset their campagn to get Congress to make large appropriations to support aircraft

manufacturers!

# Congress Accuses Manufacturers Aircraft Association of Charging U. S. Over \$2,000,000 for Temporary Use of Aeroplane Patents When Great Britain Paid Only \$95,000 for Permanent Use

Whenever there is apparent lobbying congressmen usually (Continued on page 643)



# THE NEWS OF THE WEEK



# Martin Torpedoplane To Be Tested

The Martin Torpedoplane is now practically completed and will be undergoing its official tests at the field of the Glenn L. Martin Company in Cleveland within a very few days. This plane is a big twin motored ship similar in most respects to the 800 H.P. Martin Bomber which has made such an enviable record in the hands of the U. S. Army. The chief point of difference is in the landing gear which is divided in the middle to allow for the launching of a torpedo which weighs considerably more than a ton. The plane is also equipped with apparatus for carrying

all types of bombs.

The big Martin is attracting a great deal of interest and its performance is sure to be closely watched as it is the first serious attempt of this government to use an aeroplane for the launching of a torpedo. Experiments have been carried out with smaller planes and smaller torpedoes not only in this country but in Europe, but this performance will be the first serious attempt to use aeroplanes in naval aviation for the destruction of full sized dreadnaughts. The Martin Torpedoplane will carry the regulation Navy torpedo which is plenty big enough to sink the largest battleship afloat and its speed of over 100 miles an hour will enable it to rush into close quarters and launch its torpedo at such close range that the possibilities of a miss are minimized.

The torpedoplanes have four and a half hours fuel and can be launched either from the deck of a sea sled or sent directly from a coast defense base on shore. Their gasoline capacity will enable them to operate 200 miles from shore and return and in addition they are equipped with air bags so that a landing can be successfully negotiated on the ocean in case of an emergency. Ten of these torpedoplanes are under construction at the Martin factory in Cleveland.

# Seaplanes to Race in Alaska

Juneau, Alaska.—Landing sites, floats and other facilities are being sought in Juneau, Ketchikan and other southeastern Alaska cities for seaplanes which will participate in a proposed air race between Seattle and southeastern Alaska tween Seattle and southeastern Alaska

The Aero Club of the Northwest, with headquarters in Seattle, is making arrangements for the race. Prizes totaling \$25,000 may be offered, according to advices reaching Juneau.

Already two well-known aviators, Cliff Durant, formerly prominent automobile race driver, and Captain Sir Arthur Whit-

ten Brown, non-stop transatlantic flyer, have stated they may enter the race.

Alaskans are hoping that the aeroplane racers will break trail for aerial mail services of Alaskans. vice at Alaska from Seattle. Mail to America at present is shipped as freight and weeks could be saved in some places if aeroplanes were used.

# San Francisco to Hold Aero Show

An Aeronautical exposition will be held in San Francisco from April 19 to 20, it was recently announced. The exhibition will include aeroplanes of American, Canadian, British, French and Japanese manufacture.

One of the features on the program for the exposition will be an aeroplane race from San Francisco to Los Angeles.

# Captain Martin Offers Patents to Industry

Captain James V. Martin, the pioneer aeronautic inventor who has just returned from an extended trip in Germany, France and England, has written a letter to the Aero Club of America offering various patents which he controls to aeroplane manufacturers.

The letter follows:

"Having just returned from an inspection of aircraft in Germany, France and England, and learning that no speed aeroplanes are contemplated in Europe which do not employ special means, such as the retractable chassis, to eliminate structural resistance, I make the following offer to assist the American entrants to win the forthcoming international events.

"I offer a free license for use of my patented aeroplane efficiency devices on each and every aeroplane built in America and actually entered in an international contest recognized by the F.

"In addition to the above I offer to make available for the above purpose engineering of value relative to the adap-

tion of the following devices to speed aeroplanes: The Retractable Chassis, The K-Bar Cellule Truss, The Martin Aerofoils and Wing Ends, The Wing End Ailerons, The Aerofoil Type Fuse-lage, The Shock Absorbing Rudder, The Shock Absorbing Wheel."

# Ballooning a Popular Sport.

Ballooning as a sport is coming rapidly to the fore, stimulating the formation of flying clubs in many cities, notably Akron, Ohio. The world war increased Akron, Ohio. Akron, Ohio. The world war increased interest in ballooning because so many men were training as pilots and observers. The general interest in this exciting sport was evidenced at the recent meeting of Detroit and Cleveland sections of the Society of Automotive Engineers at Akron when four engineers, selected by lottery in which every one of the 200 visitors entered, made a flight of fifteen miles with Ralph H. Upson, an aeronautical engineer and balloonist of international fame. ternational fame.

# Aerial Police in Process

Among the twenty registrants at the Curtiss flying school at Manila are ten members of the future Philippine Aerial Police. The new constabulary will be organized as soon as flyers are available. An aerial taxi service, just established at Manila has proved even more popular.

at Manila, has proved even more popular than the flying school. The day of open-ing found 200 on the waiting list for pay Thus far the service has been restricted to pleasure flights, but service to nearby islands, especially to Cebu, 238 miles distant, is under consideration.

# Ruth Law Plans Exhibition Flights

Chicago.—Ruth Law, famous woman aviator, on her return from the Coast, recently announced that she has signed up Al Wilson, Lieutenant Hart and Lieu-

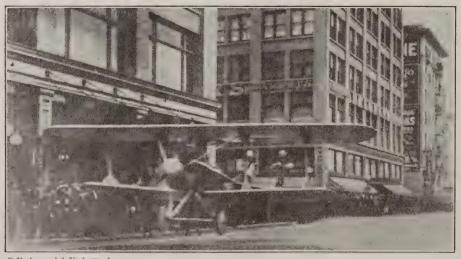
tenant Remlin, all aviators of Los Angeles, for seven weeks. Miss Law has arranged with the three men, all of them premier airmen, to put on a thriller for her at the fairs this son. The act, it is said, is a very thrilling

# Another Record

Recently we recorded the fact that a 280 lb. man had made a flight. This record has been broken by the Federated Fliers, Inc., of Minneapolis, who carried as a passenger a Mr. Ole Thorson of Minneapolis, who weighs 340 lbs., it being necesapoils, who weighs 340 lbs., it being necessary to use an ordinary rope to tie him in the plane as the safety belt could not reach around his waist. This flight was made over Federated Fliers Field in a Standard J. I. Plane, Hall-Scott motor piloted by Lieut. Nick Mamer.

# Citizens Purchase Payne Field

John H. Cox, Dave Cottrell, R. L. Betty and other citizens of West Point, Miss., have purchased Payne Field. It is expected to induce an industrial plant to make use of this magnificent field which cost the Government \$160,000.00 to erect and is fully equipped with water works, electricity, sewerage and rock streets and roads. These gentlemen are in a position to make very attractive inducements to industrial or manufacturing interests to utilize this fine outfit which they hope to have converted into useful purposes.



© Underwood & Underwood Lieut. L. V. Pickup landing an "Ace" biplane on Clay Street, Oakland, Cal. The incident aroused tremendous interest in Oakland



New York Aero Show

The management of the New York Aeronautical Show, which is to be held in the 71st Regiment Armory from March 6 to 13, announce that the entire space for aeroplane exhibits has been allotted, and practically all of the accessory space. There will be a wide variety of machines shown and the commercial note will dominate the entire show, in contrast with the exhibition of war machines at the last show.

London Reporter Uses Aeroplane
An aeroplane was used for the first time in England for gathering news on

January 26.
The Evening News sent a staff correspondent from London to Calais to see Marshal Foch lay the cornerstone of the Dover Patrol monument on Cape Blanc Nez. After the ceremonies the Evening News reporter returned to London by aeroplane with photographs and the material for his article.

He left London at nine o'clock in the morning and returned at half past two

o'clock in the afternoon.

Plan July Aircraft Show at Olympia

London.—An international aircraft exhibition will be held at Olympia, London, next July. It is anticipated that every type of machine will be represented, and it is hoped also to make provision for trials and demonstration flights at an aerodrome within easy distance of the show.

Owing to the growth of the British aircraft industry during the war, the aircraft firms have formed a body, the Society of British Aircraft Constructors, which comprises in its membership practically every British manufacturer of aircraft, aircraft engines, and their component parts, equipment and materials. This body has entered into an agreement with the Society of Motor Manufacturers and Traders unof Motor Manufactures of the der which the pre-war aero exhibitions will be continued under the joint management of the two societies. The arrangements provide for the setting up of a joint committee to promote aero exhibitions in the United Kingdom and the use of the exhibition organization maintained by the Society of Motor Manufacturers for the carrying out of its annual motor and other exhibitions.

Aeroplane Service at De Land, Fla.

De Land, Fla.—Robert Lowell, secretary and manager of the Dixie Air Service, has just closed an agreement with the De Land authorities and the Commercial Club through which an aviation field will be constructed at once. The Dixie Air Service, which is now maintaining flying fields at Sanford and Eustis, hopes to open the De Land aviation field for passenger service by the middle of February.

The Kokomo Aviation Company Reorganizes

The Kokomo Aviation Company, Kokomo, Ind., which was organized early last summer by W. H. Fagley, J. C. Patten, H. A. Bruner and G. E. Bruner, has now been reorganized and will be known as the Curtiss-Indiana Company.

organization have secured the Curtiss agency for Indiana territory and they are planning an aggressive sales campaign.

#### Martin Men's Club Organized

The Martin Men's Club, an organization of over 300 members, has recently come into existence at the Glenn L. Martin Company of Cleveland. As its name implies it is composed exclusively of the male members of the organization but membership is a voluntary proposition. Practically every man employed at the factory is a member and new members are being voted in at every meeting as the personnel of the Martin company is rapidly increasing with the expansion of business.

The purpose of the club, which meets every two weeks, is to study aeronautics in all its different phases and a programme of lectures by authorities on various topics has been lined up. On the opening night a lecture on "Radio and Its Relation to Aeronautics" was given by Mr. F. S. McCullugh, Radio Engineer of the Glenn L. Martin Company, who accompanied his very interesting remarks by a demonstration of the radio phone which he has perfected. On February 20th E. R. Preston, manager of the Aeronautics Department of the Goodyear Tire and Rubber Company, will speak on the subject of "Lighter Than Air Craft."

The officers of the club are elected by the members and consist of the customary officials and a board of directors, one member of which is chosen by each department of the factory. The present officers are: Honorary President, Glenn L. Martin; President, L. D. Bell; Vice President, Thomas Soden; Secretary-Treasurer, Thomas Beach. Directors, Lessiter C. Milburn, Ross Elkins, Leonard Booth, George Strompl, H. B. McCloud and Ben

Bartlett.

# Air Service Sales

The director of sales announces that the material disposal and salvage division of the Air Service has completed inventories of its surplus war materials and has resumed sales, which were temporarily interrupted pending the completion the inventories.

Bulletins listing the materials which the Air Service is offering for sale have been prepared and are being mailed to prospective purchasers. Included in the class of materials offered are motor accessories, chemicals, oils and paints, fabrics, lumber, shop agricultural and paints, fabrics, f rics, lumber, shop equipment, electrical equipment and miscellaneous articles. The fabrics which the Air Service is offering include cotton balloon cloth, aero-plane linen and cotton aeroplane cloth.

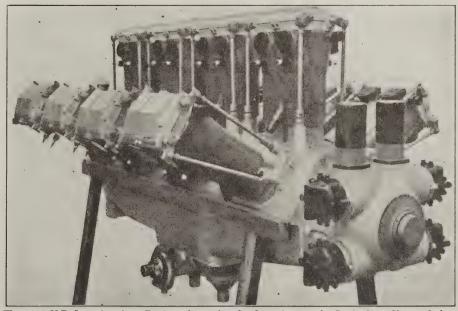
The lumber includes various quantities of such high grade woods as basswood, cherry, walnut, white cedar, quartered oak and ash.

The materials are located in different parts of the country and may be inspected at the points of location. Copies of the bulletins issued by the material disposal and salvage division of the Air Service, and additional information relaservice, and additional information relative to the terms of sale, may be obtained from the Material Disposal and Salvage Division, Air Service, Washington, D. C., or from the District Office of Air Service, in any of the following cities: Boston, Buffalo, Chicago, Dayton, Detroit,

New York and San Francisco.

# Aeroplanes to Save France's Sardines

Brest.-Such havoc has been wrought the sardine fisheries off the coast of Brittany by shoals of porpoises that the fishermen have appealed to the French Ministry of Marine to station seaplanes at fishing ports, supplied with bombs having an explosive area 300 yards in diameter, in order to get rid of this pest.



The 1000 H.P. Lorraine Aero Engine, shown for the first time at the Paris Aero Show. It has 24 cylinders, 126 mm. stroke and 200 mm. bore

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
Leon B. Lent, Assistant to the Second Assistant Postmaster General
in Charge of Aeronautics
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying
John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and Operation



**PILOTS** 

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellis
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I, Stanton, Superintendent New York-Washington Division
George O, Noville, Superintendent New York-Cleveland Division
Edward McGrath, Superintendent Cleveland-Chicago Division
William J. McCandless, Superintendent Chicago-Omaha Division
William J. Hartung, Manager, Heller Field, Newark
Herbert Blakeslee, Manager, Bustleton
Eugene W. Majors, Manager, College Park
Andrew R. Dunphy, Manager, Chicago
Maurice J. Kelly, Manager, Bellefonte
Victor W. Fitch, Manager, Newark Warehouse

PILOTS

Samuel C. Eaton Frederick A. Robinson Elmer G. Leonhardt Walter J. Smith Paul W. Smith Farr Nutter Wesley L. Smith Joseph P. Harris Clayton W. Stoner Mark C. Hogue

# Aerial Mail Fight Centers on Economy

The aerial mail service is facing a fight for its life in Congress

It must be abandoned on June 30 unless the Senate restores to the postoffice bill the \$850,000 appropriation for maintenance which was cut out by the House. main-

Otto Praeger, second assistant post-master general, who is in charge of the "aerial division" of the Postoffice Depart-ment, went before the Senate Postoffice Committee and told of recent developments.

He declared that if the Senate does not restore the appropriation an extensive program which would bring many cities within its scope in the next fiscal year, must be given up. He said that the 30 planes, now constituting the "fleet," had carried more than 22,000,000 pieces of mail in the past year.

It has cost \$365,000 a year to carry this

amount of mail by aeroplane, he declared, as compared with \$600,000 which it would have cost to carry the same mail by train. The new air routes planned for next year would save the government approximately

\$2,600,000, he said.

Senator McKellar, of Tennessee, is leading the fight for the return of the appropriation.

Aircraft advocates in the House are confident the appropriation will be kept in the bill if the Senate reinstates it. Representative Ramseyer, of Iowa, declared that the House never had a chance to vote on whether the aerial mail should be continued, the appropriation having been

# Flies at 155-Mile Rate

stricken out on a point of order.

Lieutenant J. H. Knight, a pilot on the aerial route between Cleveland and Chicago, covered the 335 miles between the two cities at an average speed of 155 miles an hour. This is said to break all speed records in this country for a flight of more than 300 miles.

Lieutenant Knight left Cleveland at 11 M. and arrived in Chicago two hours and ten minutes later.

# Mail Service to Use Martin Field

The Glenn L. Martin Company's field at Cleveland is now the center of all Cleveland's aviation activities as the aerial mail service has been allowed the use of the field and a big hangar is now under construction. As soon as its erection is complete the old hangar at Woodland Hills Park will be torn down and the Martin mail planes and De Haviland mail planes will both be housed on the Martin Field.

#### Major Leon B. Lent Joins Aerial Mail Service.

Major Leon B. Lent formerly engin-Major Leon B. Lent formerly engineering officer in the Air Service has been appointed in an advisory capacity on aeronautics in the aerial mail service as assistant to Mr. Otto Praeger, Assistant Postmaster General. Major Lent before entering the service for twenty years was engaged in mechanical engineering and has had a varied experience in correction. and has had a varied experience in connection with the design, construction and operation of steam and gas power plants. While in the service he did extensive experimental work in connection with radio experiments and has for years been editor of the Engineering Magazine "Power".

# Planes Carry Letter 1,000 Miles In 8½ Hours

Nine De Haviland-4 aeroplanes, relaying, carried a letter from Brownsville, Tex., to Nogales, Ariz., a flying distance of approximately 1,000 miles, in 510 min-utes, an average speed of nearly two miles a minute.

The first plane left Brownsville at 4.25 A. M. and the last machine landed at Nogales at 12.55 P. M., elapsed time eight hours and thirty minutes. The relay was conducted by the first surveillance group of the Army Air Service.

The route along the border was from Brownsville to McAllen, Laredo, Eagle Pass, Del Rio, Sanderson, Marfa, El Paso, Douglas and Nogales.

The speed is regarded as striking be-

The speed is regarded as striking, because one machine was required to land before the next took up the race with the

# Aerial Mail in India

The Postmaster-General of the United Kingdom announced recently that the Indian Post Office proposes to maintain a weekly aerial mail service between Bombay and Karachi, which will co-operate

with the English mail. This will afford quicker delivery for correspondence not only for Karachi, but also for places served via Karachi.

Correspondence may be mailed at any post office in the United Kingdom in the post office in the United Kingdom in the usual way in time to connect with the outward Indian mail, the special fee for transmission by air being affixed on the envelope in British stamps in addition to the ordinary postage and marked "Via Bombay-Karachi Air Service."

# Sheridan, Wyo., Has Landing Field

Through the cooperative action of the Sheridan Commercial Club, the county officials and Dr. G. H. Buffum, the city of Sheridan, Wyoming, has an excellent landing field which will help to bridge the gap between Caspar, Wyoming, and Billings, Montana.

The Sheridan Commercial Club is doing

very excellent work locally and the officers have informed us that they will be glad to give all possible information to aviators contemplating trips in this terri-

# Personal Pars

Matthew R. Riddell has been appointed assistant professor of aeronautic engineering and assistant to the director of heering and assistant to the director of the engineering experiment station at the University of Illinois. Riddell was chief draftsman for the Curtiss Aeroplanes and Motors, Ltd., in 1915-16; was connected with the Canadian Aeroplanes, Ltd., of Toronto, 1916-19, and had a prominent cart in direction was worked. part in directing war work.

# Aviators May Purchase Army Supplies

Washington.—The bill which authorizes the Secretary of War to sell gasoline, oil and other aircraft supplies at cost to civilian aviators in distress, and which they need for the continuation of their journeys, was passed by the Senate. The fourneys, was passed by the Schate. The bill authorizes the sale at contract price plus 10 per cent, and limits the amount of supplies to be sold to quantities which will enable the aviator to get to the nearest point where they can be pur-chased, and when it is impracticable to obtain the supplies in the vicinity of an Army aviation post at which he applies.

# JIGS, FIXTURES AND AEROPLANES

By A. D. WILT, JR.

NTIL a short time ago, the Government, as a matter of good policy, refused to let the public be enlightened on some of the most interesting achievements during the war. During the past year it has been most difficult for some of us most intimately connected with certain phases of the war to keep from shouting from the house tops some of the great things we knew were being accomplished.

One of the most galling things with which we have had to put up was to hear men of high standing—men who are supposed to be most intelligent and well informed—criticize the so-called delays inaircraft and other production, when they did not know the first principles of manufacture.

They did not know that before quantity production can be started on most metal parts, an elaborate and patient scientific preparation has to be made in the way of designing and building jigs and fixtures.

There are approximately three thousand working hours in one year. Would you believe that approximately one million seven hundred thousand hours' labor were necessary to produce the three thousand jigs and fixtures before the Ford Motor Company could get into production on Liberty motors at the rate of between seventy-five and one hundred per day of sixteen hours?

The four other companies making Liberty motors doubtless took equal hours of preparation in proportion to the number of motors scheduled per day. These companies were the Lincoln Motor Company, with an order for six thousand motors; the Packard Motor Car Company, with a similar order; the Nordyke & Marmon Company, with an order for three thousand motors, and the General Motors Corporation, with an order for two thousand motors. While the daily production schedules of the above varied, it is safe to venture that the enormous total of at least seven million labor hours were taken in this country in tooling up, i. e., making jigs, fixtures, cutting tools, etc., for Liberty motor production.

Do you know what jigs and fixtures are? Do you know the part which they play in making aeroplanes, automobiles, sewing machines, and in fact most everything of metal? Unless you do know, it would be very inadvisable for you to express any opinions as to the conduct of the war from an industrial standpoint.

Jigs and fixtures are to the manufacturer of metal products what patterns are to the dressmaker. They guide the cuting tools which remove the metal. To drill a half-inch hole exactly in the middle of a thousand metal discs the size of a silver dollar, exactly meaning in this case within a thousandth of an inch of the center, the mechanic would not laboriously lay off the center of each disc with a compass or dividers—he would build a metal box-like affair, about the size of a cigarette case, called a jig, which would guide the drill for drilling the hole exactly through the center of each disc clamped therein. In this way he would be able to drill the holes in all the discs in less than two hours and drill them with absolute precision. (A fixture differs from a jig, in that it is designed to become a fixed part of a machine, while a jig can be used

independently of any one particular machine tool.)

The jig for drilling the holes in the Liberty motor crank case locates sixty-eight different holes. Many of these holes are two inches apart and the holes are drilled to limits of plus or minus one thousandth of an inch between centers. That is to say, the difference between the center of any two holes has to be maintained within one thousandth of an inch.

The Ford Motor Company received its contract for five thousand Liberty motors on November 22, 1917. Several hundred tool designers were at once put on the jig, fixture and tool design. This consumed one hundred and eighteen thousand draughting hours—think of it! These are the cold facts, and as large as these figures seem you may rest assured that this designing and these jigs and fixtures were made in record time, under the able guidance of the head of their tool designing department and their competent tool makers. It was not until June, 1918, that the company began deliveries of motors. From November, 1917, until November, 1918, they employed on jigs and fixtures approximately nine hundred and forty-

eight tool makers who worked on two shifts as follows: Six hundred and fortyone on the day, and three hundred and seven on the night shift.

In summing up their Liberty motor preparation, it was necessary for them to design and build for the four hundred and twenty-nine different parts jigs and fixtures of eight hundred and fifty different types, six hundred and ninety-one special measuring gauges, one hundred and fifty-nine special arbors and cutters, one hundred and seven punches and dies, and six hundred various other tools. Over seventy thouand feet of lumber twelve inches wide by one inch thick were used in making the patterns for the three thousand jigs and fixtures. In addition to these, much preliminary work had to be done for the manufacture of the three thousand three hundred and twenty-seven parts all told in each Liberty motor. An analysis of these is illuminating.

		Different kinds
Iron castings*	. 24	2
Bronze castings	. 57	18
Ball bearings		4
Stampings	. 682	61
Drop forgings		41
Aluminum castings	. 52	21
Aluminum die castings.	. 49	17

\* Does not include piston rings.

All of the above castings required patterns before they could be cast. These were all required in addition to the patterns for the jigs and fixtures. The drop forgings required elaborate forging dies. Six hundred and eighty-two stampings required one or more costly stamping dies.

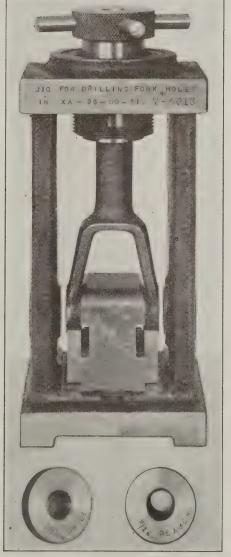
Special hardening furnaces had to be designed—in fact, the task confronting these patriotic manufacturers was fairly staggering.

I have even more sympathy for those courageous men who undertook the manufacture of the planes. They knew the task confronting them—they anticipated the criticisms to which they would be subjected on account of delays certain to arise. I am not writing this article in their defense—they need no defense—nor do the manufacturers of Liberty motors.

Some planes contain more parts than others—all are complicated. All required much preliminary preparation in the way of jigs, fixtures, templets, dies and small tools. The J N 4 D, 4 H and 6 H training planes, the S J 1 and the S 4's were all complicated, but the DeHaviland 4 service planes required the most planning.

The Liberty motor with its three thousand three hundred and twenty-seven parts represents only a small numerical part of the DeHaviland "4" plane. This has in addition to the Liberty motor thirty-five thousand three hundred and thirty separate pieces, of which seven thousand three hundred and fifty are different, and these do not include the numerous accessories which were put on the planes before they were made into fighting machines.

These included the pilot's cockpit, two Browning or Marlin machine guns and mounts, ammunition containers and ejectors, synchronizing unit complete, gun ring and bead sight, Altis telescope sight, Very pistol and twelve cartridges, two



wing and tail navigation lights, two Holt flare landing lights, heating and lighting generator and bracket, radio generator and bracket, pilot's ground lens, oxygen tank regulator and equipment complete, gunner's cockpit, bombing equipment complete with ten bombs, Wimperis bomb sight, two Lewis machine guns and mounts, ten ammunition containers, ring and bead and wind vane sight, radio equipment complete, including intercommunicating telephone, wireless telephone and wireless telegraph, camera equipment complete and three 24-plate holders and ground lens.

It is difficult to give one an understanding on which to base an appreciation of the wonderful achievement of the companies building these planes. Whether or not the DeHaviland "4" planes were a success (and they were a huge success) has nothing to do with their accomplishment. For example, the Dayton Wright Airplane Company received one DeHaviland "4" plane and a set of English prints from England, and were told by the Government to build four thousand more. It is said that the drawings and specifications did not check up with the actual plane. In any event, the drawings had to be revised. Any English blueprints of anything would have to be revised for American mechanics. The English work to ideal figures-state the exact size wanted and expect the workman to produce as close as possible to these figures. The Americans give a fixed limit on their drawings plus or minus so many thousandths of an inch, and no extra toler-

In our own factory we had an amusing experience with English prints. As tubing products manufacturers, we were sent the prints for the stick controls (steering gears) and the stabilizers for the DeHaviland "4.'s" and asked to quote prices. The stick control contains about seventy-five metal parts and is the largest metal assembly on the plane except the motor. The stabilizer elevating gear has about fourteen parts.

The prints were shown to our engineer, superintendent and department heads. They all threw up their hands, saying, "We're not watchmakers." This meant that the drawings showed almost impossible dimensions. They refused to tackle the job.

Fortunately, I knew the English system of drawings, and that they would have to be translated into language of the American manufacturer. Most of our competitors evidently did not know this, and were afraid to quote. We got the order. Just for these assemblies we had over one hundred and fifty tool makers working nearly two months on our jigs and fixtures, and their design required approximately three thousand draughting hours.

Consider how infinitely greater was the problem of the plane manufacturers. Although the Dayton Wright Company received the sample DeHaviland plane early in August, 1917, many parts had to be re-deisgned for American quantity manufacture. We are more adept in the manufacture of drop forgings, for example. Parts made by hand in England were designed into drop forgings for our production. It has always been a wonder to



those who know, consequently, that they were able to ship their first DeHaviland "4" on February 5, 1918, and follow this up with nine more in February. Then came the inevitable period of finishing preparations for quantity production and trying out the first planes. Some changes had to be made to keep up with improvements at the front. But in spite of these, quantity production was reached in May—a wonderful achievement—and brought to forty planes per day shortly after. The Fisher Body Corporation came along later with a fine production and then the Standard Aircraft Corporation.

All these manufacturers were confronted by tremendous problems.

Before the war there were practically no men skilled in aeroplane manufacture. Even at the time the United States entered the war, the army had only eleven aeroplanes. The problems were entirely new. The whole article was new. It required a widely diversified variety of materials. The following will give a slight idea of the different kinds of materals necessary to make the DeHaviland "4" plane:

2,608 wood parts, only 608 of which are alike in shape.

1,665 sheet metal parts, of which 1,500 differ from each other in shape.

20 forgings, of which 20 differ from each other.

139 tubes, of which 139 differ from each

78 castings, of which 78 differ from each other.

5,335 holts and machine screws, of which 1,500 differ from each other.

1,589 nuts of 50 different styles.

1,213 washers of 100 different styles.

10,675 wood screws of 150 different shapes and sizes.

8,609 nails, tacks, etc., of 150 different shapes and sizes.

659 wires of 20 different kinds.

87 terminal standards of 40 different shapes.

750 small metal parts of 300 different shapes.

366 pieces of linen, of which 50 are different.

12 bearings, of which 1 is different.

474 equipment, including military equipment, of which 470 are different.

343 miscellaneous parts, of which 300 are different.

Their purchasing agent faced a colossal He had to find reliable sources and provide all the above materials. Of course the Government assisted him greatly. In addition he must find supplies of such articles as bakelite, cellulois fibre, fabrikord, felt, glass, leather, nigrum, rubber, rawhide, transparent sheets, and what not. He must buy for one DeHaviland aeroplane such items as one hundred and twenty-eight yards of linen, eight hundred and twenty-seven and two-thirds yards of silk thread, two hundred and fifteen yards of special cotton tape, four hundred and forty yards of cotton twine and one hundred and sixty-eight yards of linen twine. Allowances for waste or spoiled material are not included in these figures. In addition, each plane requires gallons of shellac, varnish and dope. The entire liquid quantity of these items is approximately one hundred and ten gallons for each plane.

An analysis of the twenty-six hundred and eight pieces of wood is interesting. These pieces included six hundred and sixty-four pieces of veneer, fifteen hundred and eighty-six pieces of spruce, one hundred and fifty-two pieces of ash, thirty-six pieces of walnut, six pieces of maple, twenty-four pieces of hickory and one hundred and forty optional pieces of different hardwoods. Many of the wood pieces required what are called "templets," which are in the nature of jigs and fixtures. Approximately fifteen hundred templets and patterns were made for machining these pieces.

In addition to the wood parts there are sixteen hundred and sixty-five sheet metal parts. These require either jigs or fixtures or templets, or what are more difficult to make, punches and dies. The approximate number of dies and drill jigs which had to be designed and manufactured for making the sixteen hundred and sixty-five metal parts was four thousand. Eight hundred thousand hours is a conservative estimate of the time required to make these dies, jigs and fixtures, i.e., a little over two hundred and sixty-six working years. These are in addition to the hours required to make the jigs and fixtures for the Liberty motor.

The facts herein stated give only a surface indication of the great efforts and achievements of the American manufacturer in helping win the war. Many other great problems in addition to the designing and building of jigs and fixtures were met and overcome by our industries, such as those of organization, engineering, distribution of materials, prevention of sabotage and training of unskilled labor.

The American people as a whole must become educated to the great problems confronting the manufacturer in order to vote with intelligence on the many issues which will be decided at the polls. We are entering an age of industry on a scale greater than ever before—or an age of industrial strife; the greater the enlightenment of the people as to the problems of capital and labor the more their sympathetic understanding, and consequently the less the possibility of Bolshevism.

# THE 650 H. P. FIAT AIRCRAFT ENGINE

(Continued from page 599)

#### Propeller Hub

The propeller hub is mounted on the crankshaft extension, as shown in the general arrangement drawing, the construction being clearly shown and requiring no particular description. The diameter of the propeller hub bolts is 20 mm., and they are ten in number. aluminum cap is fitted on the front end of the propeller hub.

# Crank Chamber

The crank chamber is of cast aluminum in two sections. All the transverse webs which form the housings for the crankshaft journal bearings are of box formation, and, as may be seen in the illustration, the inside walls of the top half are stiffened by ribs, both at the sides and front and rear ends. The top and bottom halves of the crank chamber are well bolted together with a large number of 10 mm bolts on the main cent number of 10 mm. bolts on the main joint flanges, and the crankshaft bearings are also held by long bolts fixed into the lower half, which pass through the top half of the crank case, except in the case of the long centre bearing, which is held by four long bolts fixed into the top half, and passing through the lower half of the base chamber. All the crank case main bolts run through holes drilled in the crank case between the double webs of the transverse box webs, and are secured by castellated nuts.

Seven bearer brackets are formed on each side of the crank chamber, and the four magneto brackets are cast in pairs

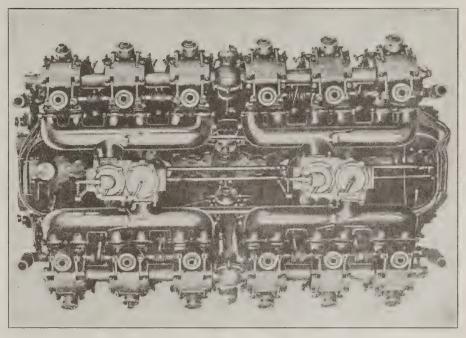
at each end of the top half.

The bottom half of the crank chamber is of simple design on orthodox lines, as shown in the illustration.

# Air Pumps

Two air pumps of the plunger type are fitted, these being operated by the two camshafts, situated between the central pairs of cylinders. The drive is by worms machined on the centre of each camshaft, situated behind the bevels. The worm drives of both pumps, as the wheels are arranged on the extensions of the small air pump crankshafts. The tion, being nearly obliterated.

deep, turned in the bottom extension of each pump barrel. Trouble has evidently been experienced with the worm gear drives of both pumps, as the teeth of the worm wheels were in a very bad condi-



Plan view of engine

pump barrels are of steel, and are provided with a number of very thin air-cooling fins. The bore and stroke are 40 mm. ×40 mm. The delivery and air 40 mm. ×40 mm. The delivery and air relief pressure valves are arranged in the heads of the pump barrels, which are fixed in the halves of their small gunmetal crank chambers by a recess, 20 mm.

# Carburetters and Induction System

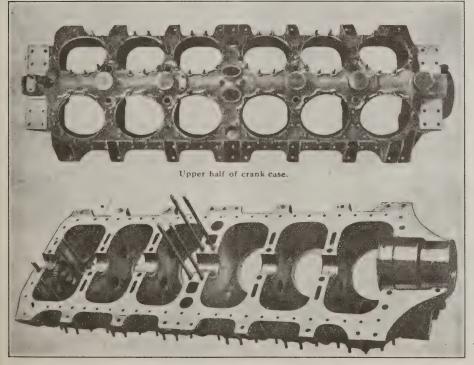
Two duplex carburetters are fitted, situated in the V between the two rows of cylinders. Each carbureter unit feeds three cylinders through one of the four separate induction manifolds, which are of copper and are attached in pairs, one on each side of the double carburetters, by large rectangular flanged joints. The twin throttles of each duplex carburetter are interconnected, and are operated through a small bevel gear mounted in the top flanged cap of the throttles, which, as shown in the general arrangement, work vertically above the variable main jets.

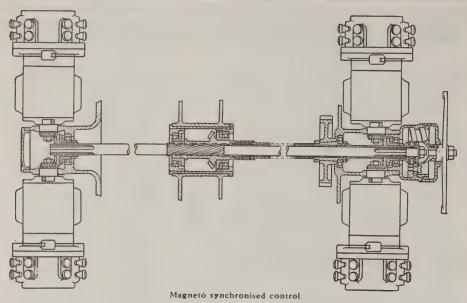
The float chambers, which are constructed so as to be readily detachable, are of normal design, and are situated on opposite sides of the carburetters, and diagonally to each other.

At the side of each float chamber is a small adjusting screw, fitted with a locking nut, and provided for regulating the air supply to the pilot jets.

An automatic ring-type air valve is

Each pair of carburetters is enclosed in a cast aluminum water jacketed body, which is connected to the cylinder water jackets and water pump in the usual way. The four float chambers are provided with overflow pipes screwed into channels drilled down the side of each float chamber. The overflows drain into large sheet aluminum collecting trays fixed underneath each carburetter, and situated directly underneath the two air intakes; although each is fitted with a central pipe for carrying off the overflow petrol clear of the machine, the arrangement strikes one as being somewhat dangerous in the





event of the engine firing back through the carburetters.

The weight of each dual carburetter complete is 28 lb., or 34.9 lb. complete with induction manifold.

The induction manifolds are of sheet copper, with steel flanges brazed at the joints, the usual copper-asbestos washer being fitted between the induction flanges being fitted between the induction flanges and the cylinder inlet ports. A large priming cup is fitted at the centre of each induction manifold, the cups being fitted with three small copper pipes leading to each of the inlet ports, and attached to the inside of the induction pipes.

# Lubrication

The lubrication system and the design of the oil pumps is similar to that used on the 300 h.p. Fiat engines. Three gear type oil pumps are employed, i.e., two scavenger pumps and one pressure pump. The two scavenger pumps are fitted one at each end of the base chamber, which is flat-bottomed, and the pressure pump is flat-bottomed, are shown in the general arrange. situated, as shown in the general arrangement drawing, directly under the rear

scavenger pump, and is driven by the same vertical pump spindle. The pump body is part of the same casting. It will be observed that all the oil pump spindles run in ball bearings. Two scavenger pumps are attached by studs to the machined faces on the bottom of the base

As shown in the general arrangement drawing of the engine, the oil pumps are driven through bevel gears by a divided tubular layshaft, which runs in ball bear-ings mounted in brackets cast in the bottom of the oil base.

These shafts also drive the vertical spindle of the water pump by bevel gearing, as shown, and are driven through an intermediate spur gear at twice engine speed from the main distribution gear on

the rear end of the crankshaft.

It will be noticed that all the distribution gears and driving shafts are mounted on ball bearings, and the rear end bearing of the pump driving shaft is fitted with a combined thrust and load race, as are the lower ball races on the oil pump spindles. From the main tank oil is fed by grav-

ity to the oil pressure pump, which de-



livers oil into the main oil pipe, which is copper, cast into the left-hand side of copper, cast into the left-hand side (facing propeller) of the base chamber. The crankshaft journal bearings are lubricated by copper supply pipes from the main oil pipe. The crankshaft journals and crank pins are bored and drilled in the usual way, and the pistons and gudgeon pins are splash lubricated by the overflow oil from the cranks; no oil lead is provided from the connecting red him is provided from the connecting rod big ends to the gudgeon pins.

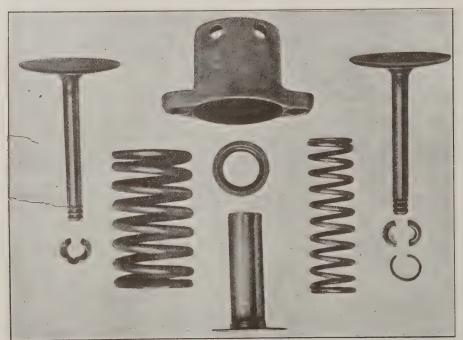
A pressure relief valve is provided at the rear end of the main oil pipe.

The aluminum bearings of the hollow camshafts are pressure lubricated by camsnarts are pressure indirected by copper pipes leading from the rear end of the main oil pipe. Holes are provided in the lower parts of the camshaft bearings to give a free passage for the surplus oil to the sump, which is taken through four oil return pipes fixed into the bottom of each camshaft case between the cylinders.

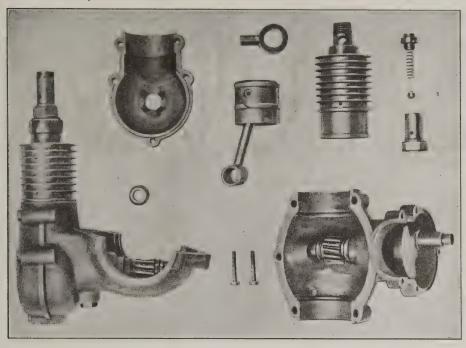
The two scavenger oil pumps, working either independently or together, return the oil from the sump to the oil tank in the oil from the sump to the oil tank in the usual way, through a secondary re-turn oil lead of copper, which is cast into the bottom of the base chamber, and is situated just above the oil pressure main leading to the journal bearings. Both these oil pipes are formed, as in the smaller Fiat engines, with U bends to allow for the differences of expansion when casting the oil base. when casting the oil base.

Five breathers are provided in the top of the crank chamber; these are fitted in top of the A between the two rows of cylinders.

The construction of the breathers is interesting; they are gauze-lined brass cages, in which are fitted small spring-loaded capped plungers, which are provided with rectangular ports cut in the flanges of the plungers. The plungers



Valye details



Air pump detail

uncover ports cut in the gauze-lined cages matic plan is given of the system. A compressed air cylinder is carried in the

#### Ignition

Four Dixie (120 type) magnetos are fitted, two at each end of the engine; they are carried on brackets cast on the ends of the upper half of the crank chamber. Each cylinder is fitted with four plugs, and the order of firing is as follows:

Propeller

1, 9, 5, 11, 3, 7 8, 4, 12, 6, 10, 2

The magnetos are driven in pairs at 1.5 engine speed by bevel gears at each end of the layshaft in the top of the crank chamber, which is situated inside the tubular shaft driving the camshaft inclined driving shafts, already referred to.

clined driving shafts, already referred to.

A synchronized advanced control mechanism is fitted as follows: Both the driving bevel gears on the extremities of the layshaft are mounted in combined load and thrust ball bearings, and each end of the layshaft floats in four castellations cut inside the bevel gears. A four-start square-thread screw is machined at the centre of the layshaft, which operates inside the bore of the bevel gear driving the two inclined camshaft driving spindles. This mechanism for advancing or retarding the magnetos is shown clearly in the arrangement drawing, which gives a plan view of the four magnetos and the complete driving and control gear.

At the rear end of the magneto driving

At the rear end of the magneto driving layshaft a two-start square-thread helix, working in a corresponding gunmetal cage, is attached to the rear end of the crank chamber. This screwed yoke is attached to the rear end of the magneto layshaft by a double thrust race, as shown in the drawing, and the whole shaft is reciprocated by the action of the control level, which, of course, is operated from the pilot's seat. This control gives a partial rotation of the driving layshaft, and a corresponding advanced or retarded drive in relation to the four magneto driving bevel gears on the ends of the magneto armatures.

# **Engine Starter**

Compressed air is used for the purpose of starting the engine, and a diagram-

compressed air cylinder is carried in the fuselage in conjunction with a reserve cylinder or reservoir, from which the compressed air is taken through a steel pipe leading to two rotating distributer valves on the engine, governed by a triple control valve on the instrument board. The construction of the compressed air distributers is shown in the illustration, and these are of the rotary type, driven by bevel gears off the camshaft inclined driving shafts. Each distributer valve is a rotating disc, in which a rectangular port is cut. Revolving against the ground valve face of the distributer body, the valve opens in sequence the six circular ports or holes drilled in the valve face. Each circular port communicates through a brass union with its respective cylinder, as shown in the diagram, by copper pipes, at the ends of which are fitted small check valves, which are screwed into the cylinder heads.

# Cooling System

The water pump, which is of the cen-

trifugal type, is driven by a vertical driving spindle, running on ball bearings, through bevel gears in the centre of the two oil pump layshafts at the bottom of the oil base. The water pump itself is situated directly in the centre and below the bottom of the sump, and it can easily be detached from the base chamber without disturbing the bevel gear and driving spindle, which is connected to the pump rotor spindle by a plain driving dog, as in the Mercédes engines. A combined load and thrust ball race is fitted to the water pump driving spindle below the bevel pinion.

The pump has two separate deliveries, one on either side, and the pump rotor is formed with two separate sets of vanes, one above the other. The two water deliveries are taken through two separate copper pipes, which pass vertically through large channels cast in the transverse webs of the central journal bearing housing in the crank case on the right and left sides, and thence into manifolds running along the outside of the cylinders.

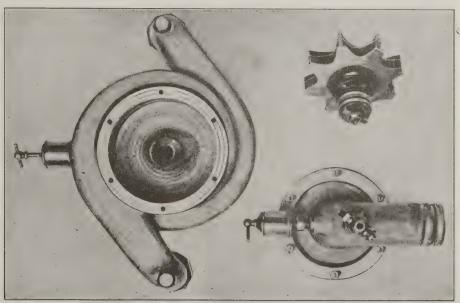
In place of a stuffing gland a hardened steel conical face washer is provided on the upper plain bearing of the pump spindle. This beds and works in the similarly cupped face of a phosphorbronze bush, which forms the top bearing of the pump. A separate screw-down grease lubricator is provided for each bearing of the pump spindle, as shown, and a spring-loaded thrust ball race is fitted below the driving dog. The diameter of the water pump inlet is 56 mm., and the diameter of each of the two water liveries is 40 mm.

# Starting Gear

A compressed air starting gear is fitted. The distributers are of the rotary disc type, and are arranged in the centre of each of the casings of the two inclined shafts.

# Cooling

The water circulation and cooling system are very well carried out. As shown in the illustrations, the water pump is situated directly below the bottom of the crank case, in the centre between the two oil pumps. The water pump spindle is driven vertically by bevel gears from the two horizontal shafts which drive the oil pumps.



Water pump detail

# LAWS 6

THERE HAS
NEVER BEEN
A PERSON
HURT IN A
LAWSON
AIRPLANE



HERE IS A FACT — AN ACTUAL PHOTOGRALAWSON AIRLINER PASSING OVER NEW YOR TRIP FROM MILWAUKEE TO WASHINGTON

LAWSON AIRLINE COMPANY

# CREATOR OF THE AIRLINER



FACTS
ARE
BETTER
THAN
FANCIES

OF THE GREAT <u>26</u> PASSENGER CARRYING RETURN.

MILWAUKEE, WISCONSIN, U. S. A.

# THE SANFORD CLINOMETER

THE Sanford Clinometer consists of a double walled glass hemisphere (see Fig. 2), filled with a green tinted liquid, and acts similar to the conventional spirit level. It differs however, in that the close proximity of the walls of the hemisphere causes the "bubble" to appear white while the surrounding liquid white, while the surrounding liquid

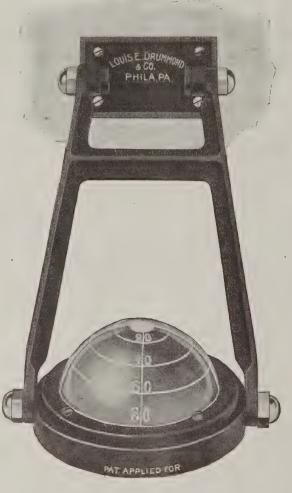
The under side of the globe is frosted, which has the effect of making the "bubble" plainly visible in daylight.

Attached to the metal frame, under the globe, is a miniature electric bulb, which when lighted, illuminates the entire surface of the globe, showing up the "bubble" as a brilliant white spot against a green background. This is the most important feature of the Sanford clinometer, as it makes it possible to read the instrument at night or in misty atmospheres, and at no time is the need for a reliable instrument so great as when flying under such conditions.

The outside of the globe is graduated by means of annular lines to 50 degrees in every direction, and a line from North to South and one from East to West. These two lines intersect at the top of two lines intersect at the top of the globe, directly through the cen-ter of the "bubble" when the plane is in a level flying position. The lines are etched in the glass and are indestructable, and are filled in with a white enamel for easy

reading.

The glass globe, or hemisphere, is constructed entirely in one piece (see Fig. 2), and after being filled through a very small hole is sealed by melting together the surrounding glass, and once sealed there is no possibility of the liquid leaking out. In selecting a glass for the Sanford clinometer, it was decided



In the course of experiments which were made to determine what glass should be used, and also the most suitable liquid, it was discovered that a globe made of Pyrex glass, filled with the liquid

which we finally decided on, could be dipped either in boiling water, or a brine registering 15 degrees below zero, without showing any ill effect, either as to stability of the "bubble" or breaking of the glass.

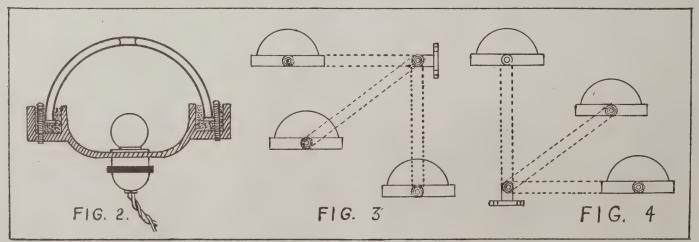
The globe is mounted in a metal ring, and is well packed with a soft material (see Fig. 2).

The bracket, consisting of a base, double swing arm, and ring, is constructed of "Verilite," which so far as we know is the lightest and strongest of the aluminum alloys, the complete instrument weighing approximately 15 ounces.

The clinometers are shipped out assembled as shown in Fig. 1, but each instrument is also supplied with a short bracket, which can readily be attached in place of the complete adjustable bracket, in case it would be found preferable to attach the instrument close to the floor or other convenient support.

Figs. 3 and 4 illustrate some of the positions available with the adjustable bracket.

The instrument is furnished with a 6 V. lamp and six feet of wire, ready to attach to the lighting circuit. If it is required in a plane where current is not available, a case made of Verilite metal containing a dry cell can be supplied. Where a dry cell is used, a 2 volt lamp is preferable, as an ordinary dry cell such as is used on bell circuits will light such a lamp for approximately 20 hours.



Lt. Col. Atkinson and Major Brooks

Military Aviators
Lieut. Col. Bert M. Atkinson, Air Ser-Lieut. Col. Bert M. Atkinson, Air Service, Aeronautics, and Major John B. Brooks, Air Service, Aeronautics, are rated as military aviators, effective from June 5, 1919, and June 7, 1919, respectively, as announced in Special Orders No. 18, Paragraph 120, War Department, Washington, January 22, 1920.

Major Scanlon Rated Military Aviator
The rating of Major Martin F. Scanlon, Air Service, Aeronautics, as military aviator, to date from October 28, 1919, is announced in Special Orders No. 17, Paragraph 14, War Department, Washington, January 21, 1920.

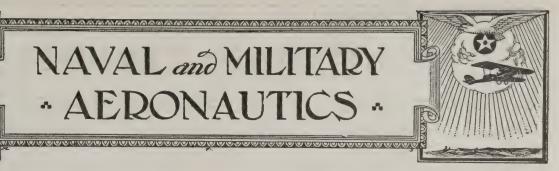
Enlisted Strength of the Air Service The Secretary of War directs that the

the allotment of 11,000 enlisted men as authorized for the Air Service by the authorized for the Air Service by the letter from the Adjutant General to the Director of Air Service, dated October 14, 1919, subject "Allotment of personnel under Act of Congress approved July 11, 1919," is hereby increased by 1,300 to provide for the 1,300 flying cadets authorized by law thorized by law.

Director of Air Service be informed that



# NAVAL and MILITARY **AERONAUTICS**



# Radio Message from an Aeroplane Sent 175 Miles.

Recently during the regular maneuvers of the 37th Infantry at Fort Mackintosh, wireless signals sent from an aeroplane were recorded on the receivers of the U.S. Intelligence Station at Del Rio, Texas, a distance of 175 miles. An altitude of 300 feet was maintained during most of the time and a general north and south course was flown. Several messages which were coded and repeated were received without a break although the op-erator listed in his report that they became faint at times and the distinctness varied which was likely due to the direction of the flight.

This is perhaps the greatest distance that messages have been received from S. C. R. No. 73 Radio set and will probably go down as a new record. "D" tap with 550 meter wave length was used.

# Reserve Military Aviators Now Rated Aeroplane Pilots

There seems to be a considerable amount of misunderstanding and confusion regarding the change in the rating of all reserve military aviators to the rating of aeroplane pilots.

Paragraph 1584½, Army Regulations, creates the rating of aeroplane pilot effective October 16, 1918. This rating has been created to supplant the rating of reserve military aviator under instructions from the Director of Air Service. Orders have been issued rating all reserve military aviators who held such rating on October 16, 1918, to the new rating, viz.: aeroplane pilot, effective on said date. Copy of said orders are now being published, and will be forwarded to all officers affected.

#### German Aeroplanes Received at the Wilbur Wright Air Service Depot

There has been received at the Wilbur Wright Air Service Depot at Fairfield, Ohio, during the past few months as varied a collection of German aeroplanes as may be seen in America. These aeromay be seen in America. planes were received in connection with the armistice terms and were ferried from the front by American pilots to Romorantin, France, and at that point were taken apart and shipped to America.

Among the types at the Wilbur Wright Air Service Depot are: Fokker's Pfalz, Hanover, Friedrichafen, Gotha, AVG, LVG Haberstadt, Albatross, DEW, Rumpler, Roland, Siemens - Schukert and two sets of upper wings for the famous Junker C-1, all-metal type aeroplane. The sheet surfaces of the wings for the Junker aeroplane are of corrugated iron and are very well internally braced with semi-tubular aluminum alloy. Group characteristics of these plans with their heavy substantial large bored upright motors are easily distinguishable.

# Navy Seaplane NC-4 to Be Dismantled

Commander Albert C. Read, U.S.N., who made the pioneer transatlantic flight in the U. S. Navy Seaplane NC-4, after a recruiting trip of nearly 9,000 miles, has taken a farewell to his historic ship and after submitting his report to the Navy Department has been assigned for duty at the property of the p the naval air station at Pensacola, The performance of the seaplane during the recruiting campaign, which covered the coast from Maine to Mississippi and followed the Ohio, Mississippi and Missouri rivers and gave the people of the Mississippi Valley their first opportunity of getting an intimate idea of some of the Navy's activities, was no less remarkable

than the work of her commander. At no time was it necessary to seek help for repairs, which were made by her crew. The ship was never in any serious danger, although lost in a fog for a time in the gulf, and she has more than 12,000 miles to her credit. Her last non-stop flight, from Charleston, S. C., to Rockaway, N. Y., was made in nine hours and forty-five minutes, a distance which by rail would require two days of travel. This flight further demonstrated the correctness of the design of the seaplane, its serviceability and the ability of her crew to handle her under any conditions. On landing at Rockaway, the ship was caught in the ice and somewhat damaged, but not seriously. The NC-4 is being dismantled and will be stored in one of the hangars at Rockaway until a decision has been reached as to a permanent exhibit of the Two propositions are under consideration, one to place the NC-4 in the Smithsonian Institute at Washington, where it will be necessary to make accommodation for the huge craft, and the other to house the boat in a specially constructed building at Annapola. In the Navy, the proposal to keep the NC-4 at the Naval Academy is favored.

# Another Airman Joins Polish Squadron

Paris.-Captain Harmon C. Rorison, of Wilmington, N. C., an officer in the United States Army Reserve Corps, aviation service, has arrived in Warsaw and joined the Kosciusko squadron in fighting against the Bolsheviki, according to advices from the Polish capital.

To enlist with the other Americans making up the squadron, Captain Rorison traveled 6,000 miles and accepted the rank of lieutenant.



Germany puts her aero engines to a new use. Two 6-cylinder Benz being used to propel a railroad car



# FOREIGN NEWS



# Air Line Opened in Africa—Cairo and Cape Town Linked By New Service.

London.—Cairo and Cape Town, representing the extremes of the African continent, have at last been linked by an air service. The British Air Ministry has announced that the air route, over which engineers have spent long months of labor amid great difficulties, is finally ready for traffic.

This means that the time heretofore required to traverse the continent—from ten to twelve weeks—has now been cut down to about one week, and that heretofore secluded sections of Africa will be opened up to the world.

#### Siam's Air Service

Siam will start an air postal service in January between Bangkok, the capital, and the Eastern Provinces. It is anticipated that this will reduce the present time taken by mails on the land journey, 16 days, to 6 hours.

#### \$1,000 for a Transatlantic Stamp Souvenir

\$1,000 for a Transatlantic Stamp Souvenir

Wednesday, September 10th, was the last day of the "auction" for a unique stamp souvenir of the first Transatlantic Air Post. The stamp was one of the 3 cents brown Newfoundland Caribou issue, overprinted "First Transatlantic Air Post, April, 1919," and used to frank the letters conveyed by Mr. H. G. Hawker on his famous unsuccessful Transatlantic flight on May 18-19, 1919. It is unused and initialed on the back by Dr. J. A. Robinson, Postmaster-General of Newfoundland, and mounted in a specially designed morocco album. The mount has been autographed by Viscount Northcliffe, H. G. Hawker, K. Mac-Kenzie-Grieve, Thos. Sopwith, J. Alcock and A. Whitten Brown. It was put up for "auction" at the Stamp Exhibition, at 110, Strand, W.C. 2. Bids were received by telegraph and telephone, and early on the last day of the "auction" the highest offer was 70 guineas. Just before mid-day several enthusiasts met and in a short quick contest 70 guineas became 100 guineas, and thence by 5 guinea jumps, the possession of the souvenir was finally awarded to Lieut-Colonel E. S. Halford, of the Air Ministry, for 200 guineas. The \$1,000 goes, without deduction, to the Permanent Marine Disasters Fund of Newfoundland.

#### To Try to Fly from Australia to U. S.

Vancouver, B. C.—Major D. A. Yarnold, British Royal Flying Corps ace, has left for England to make arrangements for an attempted flight across the Pacific from Australia to San Francisco.

A special Vickers-Viking machine will be built at Waybridge, England, for him, he said. He must get permission for the flight from the British War Office.

# Experiments in Hovering Flight

Capt. Hamersley, M.C., has been making experiments at Hamble in hovering flight. He took up the Avro "Baby" in a wind of about 40 m.p.h., faced the wind, and throttled down. By nicely calculating the respective strengths of thrust and drift, he succeeded in remaining in the same spot over the aerodrome for about five minutes. The spectators say that it was a very curious sight. At Amsterdam he had allowed the Baby to be blown backward and landed on the aerodrome without turning; but he wanted to see whether it was possible to actually hover over a spot for five minutes, and he succeeded.

#### Woman Flies from Paris to Morocco

Rabat, Morocco.—A French woman has arrived here from Paris by air, having made the flight in two days. This is the first case of a woman flying from France to Morocco. Her route was via Toulon, Barcelona, Valencia, Alicante, Granada, distance covered was about 1,150 miles.

#### Paraguay Makes Aeroplanes

Washington—Plans have been approved by the Government of Paraguay for the erection of buildings, shops and hangars, for the future school of military aviation, according to a recent commerce report. Owing to the various difficulties, such as lack of shipping from Europe and the United States, nothing has yet been done in the matter. However, the arrival at Asuncion of an Italian aviator in a direct flight from Buenos Aires has given a strong impetus to the interest in aviation. A club known as El Club Paraguayo has been organized for the purchase of aeroplanes.

The French Aviation Commission, now in Buenos Aires, has been invited to Asuncion and it is expected that as a result of this visit, additional impetus will be given the aviation movement in Paraguay. Consul Balch advises firms advertising American aircraft to send their catalogs or other literature to El Ministerio de Guerra y Marina, Asuncion, and to El Aero Club Paraguayo.

# Air Board in India

An Air Board has been constituted as a purely advisory body to advise the Commerce and Industry Department. This department now deals with all questions concerning civil aviation. The members of the board consist of the Secretary to the Government of India (Commerce and Industry Department), the Director General of Posts and Telegraphs, India, the officer commanding the Royal Air Force, a representative of the General Staff, and the Financial Adviser, Military Finance Department. There is also a Secretary of the Board.

# Plane Service for Peruvian Coast

Lima, Peru.—Announcement is made that the Handley Page Aeroane Company will in a short time inaugurate commercial hydroplane
service along the Peruvian coast. A pilot and
three mechanics have arrived here and two
aeroplanes in charge of a second pilot are expected to arrive in the near future.

# Aviation College for Peru

Lima.—Commander Lebeaudlez, head of the French military-aviation mission, has held an important conference with President Leguia. The result will be the establishment of a National Military College of Aviation in Peru.

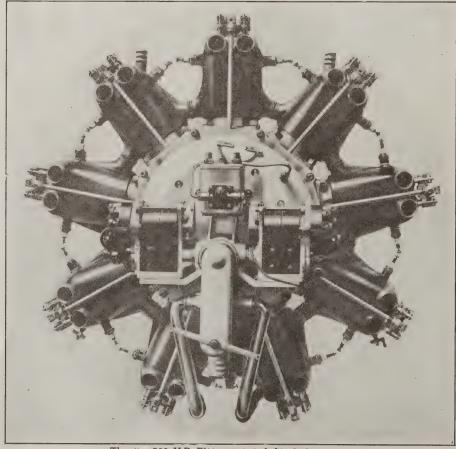
# Fiat Company's New Motor

Fiat Company's New Motor

The Fiat Company, having specialized during the war on vertical and V-type water-cooled aviation engines, the appearance of a 9-cylinder water-cooled star type comes somewhat as a surprise. The first sample of this series was exhibited at the Paris Aviation Salon, where it attracted considerable attention.

The nine cylinders are steel forgings with welded-on water jackets, and are mounted around a circular aluminum crankcase. The intake pipes are inside the water jackets, and consequently are heated by the water circulation system. There are four valves per cylinder mounted in the head and operated from a single plate cam and push rods. The crankshaft, which has a single throw, and is carried in ball bearings, receives the master connecting rod and the eight auxiliary rods, all of which are mounted in ball bearings. Ignition is assured two high tension magnetos mounted on a platform on the rear face of the crank-chamber. Each magneto fires nine plugs, which are mounted horizontally in the cylinders below the valves; thus either magneto is capable of running the engine. On the same face of the crankchamber is the double piston-type oil pump, and immediately below it is the water pump. The single carbureter, with adjustment for high altitude flying, is also on this side of the engine. The mixture is taken through gas passages in the base chamber to the pipes inside the water jackets, and from there to the valves in the head.

This engine designated Type A-18, develops 300 h.p. at 1800 revolutions and 320 h.p. at 2000 revolutions. The total weight empty is 500 lbs., and with water 546 lbs. The weight per horsepower is thus 1.6 lbs. without water and 1.9 lbs. with cooling water.



The new 300 H.P. Fiat water-cooled aviation motor



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon



# A British Compressed Air-Driven Model.

As will be apparent from the cuts, this is a tractor monoplane, possessing a two membered fuselage and a tapering wing plan, in which respect it resembles the well known Martinsyde monoplane.

The two longerons are of spruce, ½" by 3/16" at their greatest cross section, which is situated 18" from the nose of the machine, from which point they taper away to 3/16" square at the ends. They fit into the sockets on the engine at the front end, while they are united at the rear by gluing and binding. They should be bent at the front to follow the contour of the container, from the rear of which they taper until they meet at the tail. One cross member only spans the framework, situated behind the container, pinning and gluing retaining this in position. The container is fixed by wire distance pieces soldered to it, the other ends of these being bent to the form of a lug and bound with three-cord carpet thread to the longerons.

The chassis is of 16 gauge piano wire, preferably of the tinned variety. It is made in three portions—the two V shaped side struts and the axle—the points where the struts meet the axle being bound with florist's wire and soldered; 4" rubber-tyred disc wheels are to be slipped on the axle arms and a bead of solder dropped on the axle ends to keep them in position. The ends of the struts should be bound to the fuse-lage with fine tinned iron wire and just touched with a soldering bit.

The tail skid is a piano wire one, formed by crossing two pieces of piano wire, as will be obvious from the plan view, thread-binding securing it to the frame which binding should be smeared with tube glue.

Birch is to be used for the main planes, 3/8" by 1/16" in cross section, five ribs connecting the wing spars of each half wing. Each rib should be cambered to  $\frac{1}{2}$ ", the maximum camber being situated  $3\frac{1}{4}$ " from the leading edge. The wings taper in plan from 10" at the root to  $8\frac{1}{2}$ " at the tips, the trailing spar sweeping forward.

Yellow Japanese silk may be used for covering, being afterwards proofed with two thin coats of coach varnish reduced in consistency with turps. The silk should be strained from end to end first, gluing the overlap underneath, and then pulled over the spars, care being taken to keep the camber constant between the ribs. The planes are fastened to the

frame by means of clips which pass over the longerons and are bound to the wing spars. They are braced to a wire kingpost, of the shape indicated in the front elevation, by 35 gauge piano wire, sufficient tension being placed on the top wires to impart a  $3\frac{1}{2}$ " dihedral angle.

The tail is of 16 gauge piano wire. It is by far the quicker method in making this to draw its plan out full size upon a board, and to spring the wire between the heads of tacks partially driven home on each side of the outline, soldering it together while thus held down.

The rudder, of the same gauge wire, is soldered to the center of the tail as shown, the fabric for preference being sewn to both tail and rudder. Fix the tail to the fuselage by copper wire.

The propeller is carved from the solid block, 16" by 34" by 2" and is of the usual integral pattern of right-handed pitch. This is locked to the engine by means of the bolt referred to in the last chapter.

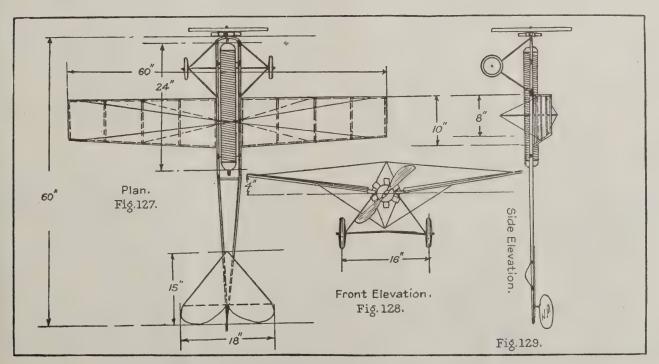
It is best to glide the model to obtain the best elevation, moving the mainplane forward to increase it and vice versa. Provision should be made for the adjustment of the center of pressure by only temporarily fixing the kingpost, to allow the wing to slide fore and aft on its wing sockets.

A slight negative angle should always be placed upon the tail to maintain the longitudinal Vee necessary for stability. Set the rudder to counteract propeller torque. Test the model with, say, 50 lb. pressure per sq. in. in the container, and launch Down wind until adjustment is perfect.

Finally keep the engine well lubricated with thin oil.

# **BOYS—ATTENTION**

In order to keep up-to-date with the news of the "Model" world, you will want to receive a copy of AERIAL AGE every week, and because we realize that \$4.00 seems a lot of money for some boys to spend at once, we have a very attractive offer to make. Write to us, addressing the Circulation Department, and we will tell you all about it.



Figs. 127 to 129. Tractor Monoplane Driven by Compressed Air



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

# Shooting the Albatross

Touchstone. When Coleridge's ancient tar Held up the timid wedding guest To tell of wanderings near and far The party who was thus addressed Learned how the albatross was slain, And how, apologies unheeding, The sailor's comrades on the main Resented this proceeding.

But times have greatly changed since then; The revolution is complete, And England's dauntless flying-men Now emulate the sailor's feat. They count the horrid fowl no loss, Knowing the kind of eggs it hatches, And he who shot the "Albatross" Got mentioned in despatches!

# Aeronitis

Presiding Genius-Flight Sergeant, what is the charge against Private Jones?

against Frivate Jones!

Flight Sergeant—Well Sir, he was drunk Sir, and he was breaking things up Sir, and he wouldn't obey orders, and he swore at me Sir; in fact Sir, he behaved just as though he thought he was the Squadron Commander, Sir.



Mother has often told Willie not to wind up that aeroplane pro-Courtesy-Globe.

A press photographer was induced to make his first flight in an aeroplane and to take some photographs. Asked when he came down if the trip had been a success, he answered: "The answer is in the negative."

#### The Truth—the Whole Truth or Anything But

Aerodrome—A large space of land divided into three parts: (1) A muddy portion where the mechanics take exercise. (2) A danger spot surrounded by red flags. (Flying pupils usually land here.) (3) A safety stretch where accidents

Aeroplane—A machine designed for carrying mud from the aerodrome to the sheds. There are three kinds of aeroplanes: (1) Those that fly. (2) Those that don't. (3) Those that stand on their noses.

Pupil (Elementary)—A man who meanders about the aero-drome in an antiquated "bus." He wears a tense expression

Pupil (Elementary)—A man who meanders about the aerodrome in an antiquated "bus." He wears a tense expression and hopes his engine will burst before he "gets off."

Pupil (Advanced)—A man who stops his propeller in the muddy portion of the aerodrome and beckons for assistance. When the mechanics arrive he smiles sweetly, says "Sorry;" blames the throttle lever, and does it again next time.

Mechanic (2nd Class)—A hapless individual who wears baggy overalls and is certain that he'll get his "First" next month

month.

Mechanic (1st Class)-A confident youth, who knows the

Motor Transport Driver—A man with a past, who talks in a superior manner of Talbots and speed records, and then drives a Ford box into the nearest ditch.

Acting Corporal—A person.
Corporal—A sort of Jack-in-the-Box who seems to know

by instinct the whereabouts of the Flight Commander.

Sergeant—A man with an enormous appetite, who is promoted to Flight-Sergeant if the 2nd Class Air Mechanics work hard enough.

Flight-Sergeant-A species of Sergeant with a louder voice

Quartermaster-Sergeant—A non-commissioned officer of great versatility. He can guess the weight of three-quarter pound of meat to within eleven ounces, and he is capable of giving hints to the producers of "The Clutching Hand."

Sergeant-Major—A man who can see at a glance whether a mechanic shaved in the morning or the night before. His regimental name is "Sir!!"—and don't forget it!

Equipment Officer—Petrol expert, car expert, aviation expert, and spends his time paying for deficiencies, and going

Adjutant-Sh!

Instructor of Flying-

Instructor of Flying——!
Captain of Flight——!!
Major—!!! (I dare not say more, fear lest I get catched.)
Technical Stores—This is a building, or part of a building, where worried-looking individuals collect blue forms and issue nuts and bolts of the wrong sizes. Now and again a mechanic obtains what he really wants. On these occasions all the storemen are promoted and the Equipment Officer gets—no he doesn't, not since July 1.

Leave—Leave is granted so that the revenue of the post-office shall be increased. A man applies for leave because his

office shall be increased. A man applies for leave because his omee shall be increased. A man applies for leave because his grandmother is expecting another funeral, or his brother is going to the front. The local police receive a telegram asking them to make inquiries. The reply telegram, of course, is in the affirmative. The man is permitted to go, but before he arrives at his home a telegraphic message is sent recalling him. He telegraphs to his best girl, telling her the theatre party is off, and then telegraphs to his C. O. explaining that he has missed the last train and can he return in the morning? The C. O. wires back he must return at once, so he excludes O. wires back he must return at once, so he catches the next train and returns at once.

# ANNOUNCING

The Second Annual

# **AERONAUTICAL SHOW**

Under Auspices of

The Manufacturers Aircraft Association, Inc.

to be held

March 6th to 13th inclusive

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Interest will range—from the "flyabout" models to aerial limousines and coupes with appointments surpassing those of the finest automobiles. The first multi-motored airplanes built in America will command attention and the general public will be impressed that the age of flying is being entered upon by the evidence of what manufacturers are providing in the way of accessories for aeronautical use.

Intensive cooperation is indicated from every quarter of the industry; and manufacturers of aircraft or accessories who desire exhibitors' space should apply to the Show Committee, Suite 1905, No. 501 Fifth Avenue, New York.

MANUFACTURERS AIRCRAFT ASSOCIATION, Inc.

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640

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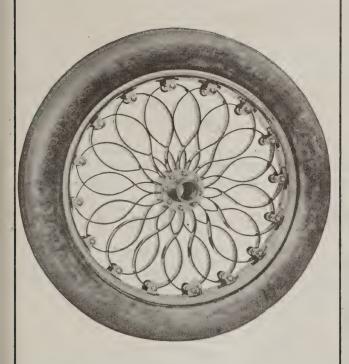
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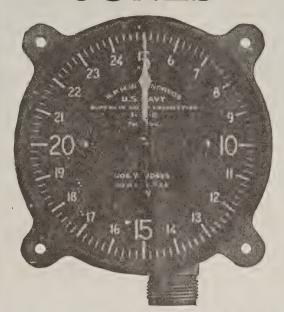
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# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

# The Glenn L. Martin Company

Contractors to the U.S. Army, Navy and Post Office Departments,

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# (Continued from page 623)

begin with looking for the organization or individuals who are paying the bills and their motives are investigated. If the motives are altruistic Congress looks upon the move-

ment as public education and listens to the arguments presented. But if the motives are selfish Congress usually rebukes the lobbyists. When the aircraft lobbying began congressmen found indications that the Manufacturers Air-Association was paying the expenses. As a rebuke to

the lobbyists all aeronautic appropriations were opposed. As the income of the Manufacturers Aircraft Association has been entirely from fees paid as patent royalties on government aeroplanes and fees paid by manufacturers making government aeroplanes, Congress was indignant to find that the lobbying was evidently being paid with funds which Congress had appropriated for the building of the Air Service, to win the war. vice, to win the war.

They object especially because the Manufacturers Aircraft Association has made the United States Government pay over \$2,000,000 in royalties for the use of aeroplane patents which had been sold to the British Government for \$95,000. For this small sum the British Government got the permanent use of the patents, while the United States Government, although it has already paid twenty times more than the British Government, still has to pay royalties to the Association for every aeroplane built for the Government.

Congressmen attribute the lobbying of certain members and employees of the Manufacturers Aircraft Association in a measure to their anxiety to get large appropriations so as to have additional royalties paid to the Association for the use of patents. Before this cross-licensing agreement was entered into, in May, 1917, Congress appropriated \$1,000,000 for the purchase of aeronautic patents. Statements were circulated at that time, early in 1917, by representatives of the Manufacturers Aircraft Association to the effect that whereas the United States could only produce a few thousand planes in the next three years, the Government would save money by paying \$200 per machine. Today Congress finds that about 15,000 aeroplanes were manufactured for the Army and Navy before the war orders stopped, on which the United States paid over \$2,000,000 in royalties. The British Government constructed a much larger number of machines than the United States and paid only \$75,000 for the Wright patents and \$20,000 for the Curtiss patents—for permanent use. And while it was thought at the time that Orville Wright would benefit by these payments, and this had gone a great way to employees of the Manufacturers Aircraft Association in a benefit by these payments, and this had gone a great way to get official acceptance of the cross-licensing scheme, it was found on investigation that the patents were owned by an exploiting corporation in which Orville Wright was not interested. interested.

It must be said in favor of congressmen who object to this condition that they are in favor of rewarding inventors but, in the words of the Senate Investigating Committee, "the Government should never be made the victim of a patent monopoly which it generously created for the sole protection of the inventor against infringement by persons or corpora-

#### Congress Urges Abandonment of Cross-Licensing Agreement

Various senators and members of the House of Representatives have different views on what should be done regarding the situation. Some hold that the Manufacturers Aircraft Association should be made to reimburse the Government in some way, some feel that the Government should hold that the \$2,000,000 already paid should be considered as having paid in full for "past, present and future use" of the patents involved and should not be made to pay any further royalties.

But the sentiment seems to be unanimous with the sentiment of the prominent senator who states: "I submit that it would be a movement both wise and popular if the Manufacturers Aircraft Association should now go out of business and the so-called licensing agreement be abandoned."

If the Association does not follow the senator's advice soon, and especially if lobbying is not stopped, Congress may take

steps to force the Association to dissolve.

In the above we have only touched on the most pertinent cases cited against the alleged lobbyists. The evidence seems to show cases of unethical attempts at coercion, and restraint

Looking at the situation as a whole, at the greatness and healthy development of the fast progressing aeronautic industry we find that the relation of this apparent trouble to the industry is only the relation of a sore on a healthy body. Congress may have to act as the doctor in the case, but we believe that it will not be necessary.



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Vol. 10, No. 18

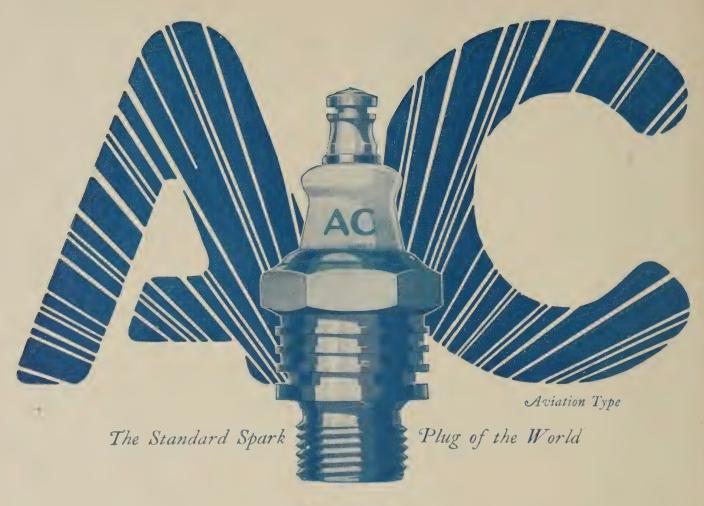
FEBRUARY 16, 1920

10 CENTS A COPY



Mail Carriers of the Air and Water

Aerial Circuit of Atlantic Proposed



# ///////

Of the twenty-nine airplanes, aviation engines and dirigibles displayed at the recent Chicago Aviation Show, eighteen were equipped with AC Spark Plugs. Five other makes of spark plugs were used on the other exhibits. This pronounced preference for AC Spark Plugs is the result of the unerringly reliable service that AC's have always given in the most exacting and arduous tests.

Champion Ignition Company, FLINT, Michigan

U. S. Pat. No. 1,135,727, April 13, 1915, U. S. Pat. No. 1,216,139, Feb. 13, 1917. Other Patents Pending

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# THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., February 16, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, FEBRUARY 16, 1920

NO. 18

# SCHEMING FOR GOVERNMENT SUBSIDIES AND CROSS-LICENSING AGREEMENT HELD TO BE MAIN CAUSES OF AIRCRAFT "EVILS"

N the last number of Aerial Age we pointed out that Congress has refused to allow further aeronautic appropriations and Congressmen threaten to continue to oppose appropriations unless the "pernicious lobbying" and other objectionable practice complained of is stopped and the Manufacturers Aircraft Association is dissolved.

Scheming for Government subsidies and the cross-licensing agreement are held to be the main causes of the evils enumerated.

As stated in the last number, deplorable activities which appear to be the work of a few individuals, mostly employees and members of the Manufacturers Aircraft Association seem to be the main cause of Congress's recent hostile attitude towards aeronautic appropriations. But the mass of evidence is voluminous and the charges many-sided, and various members of Congress have different views and have reached different conclusions regarding the situation.

In 1917 and 1918 Congress allowed aeronautic appropriations amounting to over \$2,000,000,000. Now for the fourth

time in eight months Congress has refused to grant appropriations for aeronautics. The first refusals affected Army and Navy aeronautics; the last refusal affects the Aerial Mail

Congressmen state that so long as Congress is too busy to conduct another aircraft investigation, it may continue to refuse aeronautic appropriations, unless steps are taken to stop the "obnoxious activities of lobbyists," and steps are taken to make the aeronautic industry a helpful national

institution, as it should be.

"A scheme to get unfair government subsidies is behind this pernicious lobbying," states a congressman who believes that the situation justifies a congressional investigation to determine the extent in which the public funds paid by the Government to the Manufacturers Aircraft Association for patent royalties on military and naval aeroplanes are being used in lobbying, and sees evidence of campaigning against congressmen who oppose their lobbying, as well as efforts to have "surplus" military aeroplanes destroyed, spreading unfounded propaganda about aeronautic appropriations of countries and the aeronautic situation in America and abroad; attempts to hurt the business and reputation of aircraft firms and individuals not allied with the schemers, trade restraint practice, direct attempts to stop or delay the progress of civilian flying activities, objectionable coercions, and other similar activities which are decidedly against the best public

There is evidence in many cases that the motives behind these activities seemed to be directly related to schemes to secure Government subsidies or to further the cross-licensing

agreement plan.

# Senate Investigating Committee Found C Agreement Caused Many Evils Cross-Licensing

The belief prevails among congressmen that the crosslicensing agreement is the principal cause of the present situation and some members of Congress are indignant because nothing was done to remove the objections pointed out in the report of the Senate Investigating Committee. "Had this been done," a congressman states, "the present evils would not exist." "The situation today is like the situation which existed in 1917-1918," states another congressman, "and it is evident that we cannot expect these conditions to

change unless Congress takes radical steps to change them."

A congressman who requested that Aerial Age print the report of the Senate Investigating Committee points out that the evidence at hand shows that a report of the present situation would not read any more favorable than the report rendered by the Senate Investigating Committee in 1918, which made as follows: which reads as follows:

"Although this subject has been referred to a special sub-

committe for investigation, it has constantly obtruded itself upon our attention hence we can not avoid referring to it.

"The National Advisory Committee of Aeronautics, confronted with the necessity of satisfying the claims of patentees and avoiding possible delays threatened by conflicting patent rights, determined upon mature consideration to settle these difficulties through the agency of a Manufacturers' Air-craft Corporation, to be composed of those engaged in the and empowered to license all aircraft who should pay a royalty to the company upon all planes and who should pay a royalty to the company upon all planes and parts to be constructed and to assign to the company for the common use all patents or applications therefor owned or controlled by the licensees. The bulk of these royalties was to be paid to the Curtiss and the Wright-Martin Cos. as compensation for the use of certain patents until each had received \$2,000,000. These were to be charged against cost of production and paid by the Government. The agreement was canciloud by the Department of Justice and approved by the sanctioned by the Department of Justice and approved by the Secretaries of War and the Navy.

The committee has not heard a word in approval of it. is condemned by every airplane manufacturer outside of the immediate beneficiaries. Those executing the license agreements have done so under protest because the Aircraft Board recommended or required it.

"Criticisms of it are numerous, the most serious of them being that it subjects manufacturers to onerous requirements by its beneficiaries, such as assessments for the use of plans and specifications, the purchase of the material and accessories and specifications, the purchase of the material and accessories from favored houses, the assignment and surrender of valuable patents and patentable devices to the Aircraft Association upon terms prescribed by itself, the discouragement of invention, and the inevitable control of the aircraft industry by that association or by some other interest through its agency. Your committee sympathizes with many of these sentiments, and notwithstanding the Aircraft Production. Board as now officered no longer requires or recommends the execution of the agreements by contractors, we believe the arrangement should be abrogated. We regard it as vicious and as designed to reap large profits by taking advantage of the necessities of the Government. The basic patentees should, of course, if the patents are valid, be compensated, but this should be done by the Government directly whenever the courts finally determine who the owners are and the patents should then be made free to all manufacturers.

New patents of meritorious character should be similarly acquired by the Government as they appear. Such a course 656

would stimulate invention and promote the development of

an art which is still in its cradle.

This is not a new departure but rather a reversion to an earlier policy, for Congress in 1917 appropriated \$1,000,000 for the purchase of aircraft patents, which sum is still available, and if insufficient for the purpose it can be easily increased. The Government should never be made the victim of a patent monopoly which it generously created for the sole protection of the inventor against infrigment by persons and corporations.

# A. A. Holds That Government Officials Sanctioned Cross-Licensing but Government Authorities State They Sanctioned Only Money-Saving Features

Members of the manufacturers Aircraft Association has binted out that the Government sanctioned the Cross-Lipointed out that the Government sanctioned the Cross-Li-censing agreement. But Government officials state that they only sanctioned it because they were told that it would cost less to the Government than to buy the patents, for which Congress had appropriated \$1,000,000 in 1917.

Congressmen hold that Congress only authorized the pur-

chase of the patents and not the payment of royalties.

# Act Authorizing Aero Patent Purchase in 1917

The act authorizing the purchase of the aero patent in 1917, read as follows

"To enable the Secretary of War and the Secretary of the Navy to secure, by purchase, condemnation, donation or other-

wise, such basic patent or patents as they may consider necessary to the manufacture and development of aircraft in the United States and its dependencies for governmental and civil purposes under such regulations as the Secretary of War and the Secretary of the Navy may prescribe, \$1,000,000;

PROVIDED, That such arrangement may be made in relation to the purchase of any basic patent connected with the manufacture and development of aircraft in the United States as in the judgment of the Secretary of War and the Secretary of the Navy will be of the greatest advantage to the Government and to the development of the industry;

PROVIDED FURTHER, That in the event there shall be pending in court litigation involving the validity of said patent or patents bond, with good and approved security in an amount sufficient to indemnify the United States, shall be required, payable to the United States, conditioned to repay to the United States the amount paid for said patent or patents in the event said patent or patents are finally adjudged invalid."

# Another Congressional Investigation Would Not Help

Holding another congressional aircraft investigation and airing in public the iniquities of a few ill-advised individuals and firms who may have indulged in objectionable practice, will not help the situation.

It is, therefore, hoped that the manufacturers will take steps to clear up the situation and make an investigation unneces-

# AERIAL CIRCUIT OF ATLANTIC PROPOSED

LANS for holding an Aerial Circuit of the Atlantic Pocean were announced today by the Aero Club of America, which was notified by the International Aeronautic Federation that the plan was looked upon with favor by the Aero Clubs of the countries represented in the Federation.

The plan is to have the competitors start from New York or Atlantic City and fly southward, stopping at the main cities on the Atlantic Seaboard in the United States, and then continuing by way of Cuba, Haiti, Porto Rico, across the Carribbean Sea to Caracas and along the coast to Pernambuco them. across the Atlantic to Dakar on the West Coast of Africa, then northward along the coast of Africa touching Mogador and Casa Blanca, then across either Portugal or Spain to Biarritz and along the Frénch coast, stopping at French cities to be selected by the Aero Club of France, then on to London and other cities of the British Isles to be selected by the Royal Aero Club of Great Britain and then to Christiana and other cities to be selected by the Aero Clubs of Norway, Denmark, Sweden and the Netherlands.

The Atlantic will have to be crossed in flight but the competitors will be permitted to fly either by way of Ireland, Cape Farwell and St. Johns or by way of Ireland direct to St. Johns.

From St. Johns the competitors will return to the starting point by way of and stopping at Halifax, Portland and Bos-

Aerial Circuit of the Atlantic was proposed by the The Aerial League of America, which is one of the forty aero-nautic organizations affiliated with the Aero Club of Amer-ica, and of which Rear Admiral Robert E. Peary is President.

It was referred to the International Aeronautic Federation by the Aero Club of America, for the consideration of the National Aero Clubs of the 18 countries affiliated with the Federation, whose approval would mean that about 400 Aero Clubs of the 18 countries whose national Aero Clubs are affiliated with the Federation, would cooperate in making a success of the event.

The International Aeronautic Federation was pleased with the plan and the rules and regulations are being submitted to the national Aero Clubs for their approval or suggestions for

modification.

Mr. Alan R. Hawley, Chairman of the Contest Committee of the Aero Club of America points out that the most difficult part of this contest will be the flight across the Atlantic, from Europe to St. Johns which is only a little more difficult than

Europe to St. Johns which is only a little more difficult than the flight made by Capt. Alcock and Lieut. Brown last May. The flight from Pernambuco to the West Coast of Africa is about 2,000 miles which is approximately the distance between Ireland and St. Johns. The route from Dakar to Paris has been covered twice by French aviators.

The route from Cuba to Pernambuco has been studied for the Aero Club of America and the Aerial League of America by Mr. Alberto Santos-Dumont, the wealthy pioneer Brazilian airman who has been studying the possibilities of flight in ian airman who has been studying the possibilities of flight in South and Central America for the past two years and has submitted extensive plans to the Aero Club of America.

Mr. Santos-Dumont in a letter received by Mr. Henry

Woodhouse, states that the Latin-Republics are ready to participate extensively in aeronautic activities and will welcome the opportunity of entering their best aviators in contests

Latin-American aviators have been flying in South and Central America under conditions much more difficult than aviators have to face in the United States and Europe, due to the isolation of cities in South and Central America. A number of aviators have crossed the Andes, where the stopping would have meant landing in wild country.

The general tentative rules drawn up by the Contest Committee of the Aero Club of America for the Aerial Circuit of the Atlantic and submitted to the International Aeronautic Federation provide for two classes of competitors (1) the piloting class and (2) the non-piloting class.

The rules also provide that the Atlantic may be crossed with aeroplanes or dirigibles.

Enteries of the piloting class are permitted to use any number of aircrafts, but only to chance from aeroplane to dirigible if the crew of the aeroplane is used also to pilot the dirig-

Non-piloting entries can enter as passengers on aircraft piloted by others, and can travel by heavier or lighter than aircraft but must make the entrie circuit of the Atlantic by air. Competitors will be penalized if they travel by other than aircraft over a distance exceeding 15% of the total distance covered.

It is expected that prizes for this event will amount to over

\$100,000.

The Contest Committee of the Aero Cluub of America which The Contest Committee of the Aero Cluub of America which will supervise this contest in the United States consists of Alan R. Hawley, Chairman, Lieut. Com. P. N. L. Bellinger, Col. G. C. Brant, W. Redmond Cross, Lieut. Godfrey L. Cabot, Walter Camp, Col. Milton F. Davis, Col. C. De F. Chandler, Major A. B. Lambert, Major William McIlvain, Col. James Prentice, Major J. C. McCoy, Com. H. C. Muntin, Lieut. Com. John H. Towers, Henry A. Wise Wood and Henry Wood-house

# Fumbling An Opportunity

(Editorial in Newark Star)

THE Aero Club and the Aerial League of America say that the United States has an opportunity to lead the world in civilian aerial affairs and as a market for air-There is no reason to doubt the statement, but it is craft. There is no reason to doubt the statement, but it is equally true that as a producer of aircraft America is in a fair way to trail the world. Recent aeronautical expositions at Paris and London were without exhibits from the country which produced the first successful heavier-than-air machine and gave the world the Liberty motor. Our attempts to use the aeroplane commercially or for pleasure are pitifully amateurish compared with the air-express services maintained in Europe and the development of machines and the location of Europe and the development of machines and the location of landing fields going on at a rapid rate abroad. America may have the opportunity to lead the world, but the country is woefully slow in taking advantage of it.



# THE NEWS OF THE WEEK



# Giant Seaplanes Planned for Navy

Washington.—Construction of two giant seaplanes, twice the size of the transatlantic NC-4 and larger than any in the world, is planned by the Navy Department, the House Naval Committee was told Feb. 7 by Capt. T. T. Craven, director of naval aviation. He asked for \$636,000 for this work and proposed a naval aviation programme costing \$12,890,000 for 1921.

Besides the two big planes Capt. Craven recommended four new NC planes, 150 smaller ones, one large rigid dirigible, costing \$2,700,000, three smaller non-rigid dirigibles, thirty-eight kite balloons and six free balloons.

Capt. Craven said Great Britain and

Italy were planning to build planes similar to the large ones which the American Navy hopes to complete in eighteen months. The American machines would have a carrying capacity of thirty tons, a wing spread of 140 feet, and would be capable of weathering high seas if forced to land on the water, he said.

Capt. Craven also asked that Congress

provide \$10,000,000 for new air stations, \$7,600,000 for maintenance of existing stations and \$7,000,000 for experiment work.

# Aero Club Honors Lieut.-Col. Guidoni

The Aero Club of America tendered a luncheon recently to Lt. Colonel Alessandro Guidoni, R. I. N., Air Attache of the Italian Embassy, Washington.

Colonel Guidoni was the first man to experiment and actually to drop a torpedo from a moving aeroplane which was accomplished while he was Naval Constructor of the Italian Navy, December 1912. He later built a monoplane seaplane with two Gnome 200 H.P. motors especially for the purpose of carrying and launching torpedoes which was successfully accomplished in 1914 with this machine. Later experiments were carried out using Caproni triplanes and a squadron of Capronis was stationed at Venice for operations in the Adriatic.

England also began experiments in dropping torpedoes from aeroplanes in 1913 and during the war had a special school established at one of the stations for training in this particular work and in 1915 they sank four transports in the

Sea of Marmora.

The Germans also used the torpedoplane and sank the steamer S.S. Jena and another vessel in 1917.

Although Colonel Guidoni was the first to set the example, Admiral Bradley A. Fiske had already patented this idea in July 1912 and it was fully explained and widely published in the magazine and papers at that time and in spite of the developments and practical results obtained by the English, Italian and German na-vies, we have not yet heard of any action taken by the U. S. Navy to develop this device which some authorities think may become one of the most efficient weapons in future naval warfare.

Among those present at the luncheon were: Rear Admiral Bradley A. Fiske, Vice-President of the Aero Club of America; Major Arthur Bles, British Administrator of the City of Cologne; Major A. Scrutton, R. A. F.; Mr. Henry Woodhouse; Captain Robert A. Bartlett, A. T. S.; Mr. Harrison Williams; Mr. Augustus Post, Secretary of the Club.

# Keuka Industries Buys Curtiss Plant

HAMMONDSPORT, N. Y., The Curtiss Aeroplane & Motors Corp. factories at Hammondsport, N. Y., have been sold to L. J. Seely as the home of the recently formed Keuka Industries, Inc., and will be used for the development and manufacture of a new automobile engine. While the engine is being devel-

gine. While the engine is being developed several contracts will be undertaken to hold the working force together.

Officers of the new Keuka corporations are: L. J. Seely, president; John H. McNamara, vice-president; K. B. MacDonald, secretary and treasurer. The directors are Glenn H. Curtiss, Hugh Satterlee, and the officers mentioned. All of these men, with the exception of Satterlee, have been for years connected with the Curtiss companies. nected with the Curtiss companies.

# British Ace Plans Flight Across Pacific

Major D. A. Yarnold, of the Royal Fly-Corps, a well-known British is superintending the construction in England of a Vickers-Viking aeroplane with which he will attempt the crossing of the Pacific Ocean from Sydney, Austrathe Pacific Ocean from Sydney, Australia, to San Francisco. He is under contract with the Vickers company to attempt the flight of 6,575 miles. From Sydney to the Fiji Islands, the first stop, the distance is 1,748 miles; from the Fijis to Honolulu 2,736 miles, and the last leg, Honolulu to San Francisco. 2080 miles Honolulu to San Francisco, 2,089 miles. Prizes of \$50,000 each have been offered by H. J. Heinz of Pittsburgh and Thomas H. Ince of Los Angeles.

# Honors for American Aviator

Paris.-A bust of Lieut. Edmond P. Graves of Boston, a member of the Kosciusko Aero Squadron of the Polish Army, who was killed in a flight over Lemberg on November 22nd last, will be placed in the Polish Hall of Fame.

William Wellman of the French Flying Corps and Lieut. G. Burnell Manly, U. S. Air Service, who are aces, now flying for Goldwyn Motion Picture Studios

Polish Diet will also be requested to confer posthumously upon Lieut. Graves the Order of Military Valor, the highest of all Polish decorations.

# By Aeroplane to Get Train

Palm Beach.—Mrs. O. W. Hyatt of Kansas City engaged an aeroplane re-cently to take her to Jacksonville after the receipt of a telegram saying her husband was critically ill at home and advising her to leave at once.

There were no trains owing to a cloudburst and flood near St. Augustine. Mrs. Hyatt expected to make the 300-mile trip to Jacksonville in five hours, and catch a

train there for Kansas City.

#### Atlantic Vickers Presented to British Nation

Messrs. Vickers and Rolls-Royce have jointly presented to the Science Museum at South Kensington, London, for the British public, the Vickers-Vimy-Rolls-Royce biplane in which Alcock and Brown made the first direct flight across the Atlantic on June 15, 1919. The plane will be preserved in its present state as a historical relic of the nation.

The same companies have announced

their plan to present the Commonwealth Government of Australia the machine in which Captain Ross Smith flew from

England to Australia.

# French Aviators Form Union

Paris.-Aviators have formed a union here, decided on minimum salaries and adopted a standard form of contract for members. Second Lieutenant Antoine Marchal, who flew across Germany, dropping proclamations on Berlin en route, has been elected president. The union will open an employment agency for the benefit of an accident fund and will make a study of insurance for its members.

#### First Meeting of Sub-Committee On Commercial Aviation

The first meeting of the Sub-committee on commercial aviation was held on Monday, January 12, at 10:30 A. M. in the office of the Chairman, R. S. MacElwee, Bureau of Foreign and Domestic Com-

merce.
Present were: R. S. MacElwee, Chairman, Col. G. Sevier, G. S., Lt. Col. Horace M. Hickam, A. S., Comdr. Childs, U. S. N., G W. Lewis, Nat'l Adv. Com. for Aeronautics, W. R. Manning, F. T. A., E. Eggerton, Post Office Dept., Mr. Stuart, Forest Service, C. A. McQueen, Latin Amer. Div., F. R. Eldridge, Far Eastern Div., I. J. Briggs, Bu. of Standards.
Mr. Manning and Lt. Col. Hickam presented reports and considerable data

sented reports and considerable data showing the status of commercial aviation in South America and the Far East. The reports to date show that the English, French and Italians have been very active, and in a large measure successful, in establishing flying fields, commercial companies for aviation, and even air lines. Foreign governments have been liberal in presenting training planes and sometimes the entire equipment for an esquadrille or two for the use of South American governments in order to stimulate their interest in aviation.

Conclusions of the meeting were that those present voluntarily associated themselves in an interdepartmental sub-committee to consider this subject intensively for an initial period of two months (and longer if desired). The meetings will be Mondays at 10.30 in the same place, un-

til changed.

At the next meeting each member will submit (a) suggestions for a question-naire to be sent to the officers abroad of the Departments of Commerce and State; (b) each will submit a short report of the activities in the civil use of the aeroplane by his department; (c) suggestions as to the steps that should be taken by this committee to stimulate concerted effort to promote commercial aviation at home and abroad.

The object of the committee may be summarized as follows: to exchange in-formation among the departments con-cerning the activities of each in commercial aviation, to collect all the information possible concerning progress in commercial aviation at home and abroad; and to formulate a program for promoting commercial aviation through public and

private initiative.

It was agreed that the representative of the Manufacturers' Aircraft Association should attend the meetings of the committee.

#### Aeronautical Advisory Committee Moves

The National Advisory Committee for Aeronautics, which since the close of hostilities has been quartered in one of the temporary structures at Fourth Street and Missouri Avenue, Washington, D. C., has removed its offices to the second floor, seventh wing of the new Navy Building at Seventeenth and B Streets. The official address of the committee is now 2722 Navy Building.

# Balloon as Steeplejack.

ANNAPOLIS.—The Government wireess plant on the Severn River, across from the Naval Academy, has been put practically out of commission owing to the heavy sleet storms which burdened the antennae on the four towers.

To relieve the situation a forty-foot cartine belloon in height seed there from

captive balloon is being sent here from Cape May, and an aviator will come from Washington. From the balloon he will scrape the ice off the wires.

# Balloon for Radio Station

Annapolis, Md.-A captive balloon, forty feet through at its largest diameter, been added to the equipment of the high-power naval radio station here. It will be used when the wire antennæ, over 600 feet in the air, need attention for any purpose. The balloon will be kept for emergencies as a part of the regular equipment of the station.

The radio station here is the most powerful in the United States. It is used as a sending station to European points, Panama, and even Hawaii.

# New Fiat Engine

A short time before the end of the war the Fiat Company produced a new type of 12-cylinder aviation engine developing more than 400 h.p. This engine has given such excellent results under test that it has now been decided to place it on the market.

The main objects sought in this engine were complete accessibility of all organs requiring regular attention, such as magnetos, carburetors, valves, water pump, oil pump, etc., and at the same time to reduce area and weight in relation to the power developed. This engine, which is officially designated A 15-R, is one of the cleanest-cut and most pleasing looking aviation engines ever built. While external pipes and exposed mechanism have been avoided throughout, accessibility has not been diminished, but is much greater than on other engines produced up to this

The V-type 12-cylinder engine possesses considerable advantages over the vertical six of equal power. The crankcase and the crankshaft are shorter, the shaft diameter is smaller, while the effort exerted on the individual cranks is smaller, all of which tends towards a reduction in

weight.

In the 12-cylinder engine the equilibrium of the inertia and centrifugal forces is perfect, while the more regular impulses reduce vibration to a minimum, impulses reduce vibration to a minimum, to the great advantage of the propeller. The only objection which can be brought against the 12-cylinder V-engine is that it requires more attention than a 6-cylinder engine by reason of the greater number of plugs, carburetors, valves, etc. In the new Fiat this objection has been diminished, if not entirely removed, by care-

ful designing with accessibility promi-

nently in view.

The cylinders are separate steel forgings welded together in groups of three, with a common water jacket for each line of six. An interesting feature is that the intake manifolds are of sheet steel passing inside the water jacket between the centre and the outer cylinder of each group of three. This is a very fine example of the art of acetylene welding, and has the advantage of providing in-ternal manifolds heated by the circulating water, with carburetors bolted up direct to the outside of the cylinder blocks. It avoids the usual complication

and inaccessibility of carburetors placed in the angle of the cylinders.

There are four valves per cylinder mounted in the head, with the exhaust led away from the outside from four ports for each line of six cylinders. The valves are operated by an overhead camshaft for each line of cylinders. Rocker arms with an adjustable mechanism for valve stem clearance are used, and the whole is covered by a sheet steel housing, which both prevents oil leakage and adds to the clean appearance of the engine.

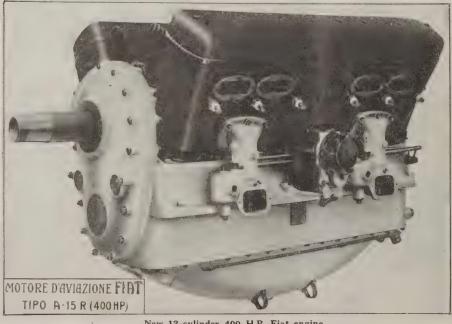
Each overhead camshaft is operated by a bevel gear mounted on the centre of the crankshaft and an inclined and enclosed shaft. These two drive shafts are telescopic in order to allow for dilations by reason of heat, and the central location of the valve operating gear adds to the purity of lines of the entire engine. The bevel gear which serves to drive the camshaft also operates the gear type oil pump placed in the lowest portion of the base The water pump is at the rear chamber. of the engine, driven direct from the crankshaft, and the air compressor pump is driven off the water pump by means of

reduction gears.

The crankshaft is caried in five intermediate bronze bearings lined with white metal, and a very heavy ball bearing at each end. Tubular connecting rods are used with articulated ends. are light aluminum alloy type with cast iron rings. There are two magnetos mounted centrally with their distributors facing outwards, and placed midway between the two carburetors on each side. The carburetors are four in number, being one for each set of these wife. ing one for each set of three cylinders. They are of cast aluminum and are automatic at all engine speeds. With this arrangement the carburetors, the magnetos and the spark plugs are perfectly accessible by removing one side of the engine housing. These are parts of the engine which need most frequent attention and adjustment and which have therefore been made most readily accessible.

The propeller is a geared down type, with a ratio of 1 to 1.51. The reducing gears are herring-bone type, and the progears are herring-bone type, and the propeller shaft is of very big diameter, and is mounted on heavy radial and thrust ball bearings. This shaft was originally intended for a machine gun to be fired through it, and is bored to 58 mm. internal diameter. The propeller, which may be either pusher or puller type, is locked on the shaft with a mechanism very similar to that of Rudge-Whitworth wire wheels. wire wheels.

Cylinder bore is 120 mm., with a piston stroke of 150 mm. The engine develops stroke of 150 mm. The engine develops 400 h.p. at 2300 revolutions, and gives its maximum of 425 h.p. at 2500 revolutions. Being geared down, the maximum propeller speed is 1500 revolutions. Weight of the engine empty is 800 lbs., and weight with water and radiator 903 lbs. Weight per horsepower empty is exactly 2 lbs., and weight complete with water and radiator 2.3 lbs. per horsepower.



New 12-cylinder 400 H.P. Fiat engine



# Engineers Use Aeroplanes for Survey

One important reconnaissance mission was carried out on January 9, 1920, in connection with the survey for the trans-Isthmian military roads. The work was carried out at the request of Col. D. D.

Pullen, Engineering Corps, who is in charge of the surveys for these roads.

Col. Pullen and two of his assistants,

A. W. Brooks and G. V. Barril, made the trip as observers. They were piloted by Major William Ord Ryan, Captain by Major William Ord Ryan, Captain Thomas Boland and Second Lieutenant Homer B. Chandler, respectively. The fourth aeroplane was piloted by Second Lieutenant Elmer F. Degon, with Second Lieutenant Dayton D. Watson, as observer. The purpose of the mission was to select the best line for a survey from Monte Lirio, C. Z., to Gamboa, C. Z., thence to Alhajuela, R. P., and thence to Porto Bello, R. P., a distance of about sixty miles. The country over the last half of this trip is absolutely virgin junhalf of this trip is absolutely virgin jungle interspersed with mountains, some of which are over three thousand feet high. All four teams successfully completed the work to Gamboa, but then, due to low the work to Gamboa, but then, the to be hanging clouds, three of the planes were unable to follow the flights as outlined. The aeroplane operated by Lieutenant Degon followed the correct course, and Lieutenant Watson collected some very valuable data on the topography of the country. His findings will be used as a guide by the engineers in making the survey for these important roads. The survey for these important roads. work performed on this mission should save several months' work by exploration parties in locating the best line of survey.

# Aeroplane Service Development in San Francisco

A corporation known as the Airway Development and Service Company, Inc., has been formed in San Francisco to participate in regular schedule passenger service, cross-country trips, special trips, advertising, and all activities in which aviation may be used.

The corporation now has Curtiss Orioles, Standards with Hispano Suiza motors, flying boats and sea planes. Hanmotors, flying boats and sea planes. Hangars will be erected as soon as possible at a field to be selected in Oakland or Berkeley. The pilots are all ex-service men and have flown with the American Expeditionary Forces in France.

Chester R. Clarke, an ex-service flyer, is the vice-president and general manager, and the directors are C. C. Wright, B. G. Willis, C. R. Clarke, Percy V. Long, Earl P. Cooper, A. L. Johnston and A. C. Burke

# Silent Aero Engine Made.

WASHINGTON.—A silent airplane motor has been developed at Manchester, England, according to Henry F. Grady, acting American commercial attache at

London.

Capt. William P. Durtnall is credited with having evolved this new type engine. The exhaust gases leave the engine at one-half pound pressure per square inch, which results in the "silent" operation. The claim also is made that the great reduction in temperature makes it impossible to get a flame from the exhaust under any circumstances. A further claim is that cheap, heavy crude oil can be used in these engines and that full power can be produced at altitudes up to 20,000 feet.

# Commercial Air Service Begins in Philippines

A 1100 mile flight by a Curtiss Seagull touching the principal islands and cities of the Philippines and demonstrating the efficiency of aircraft as carriers for the Philippine Health Service, the mails, passengers, and merchandise, was one of a number of events marking the beginning of active commercial aviation in the Islands. Other significant occurrences are ands. Other significant occurrences a re the opening of a flying school for Philip-pines, a flight from Manila Bay to the Pacific Ocean by Governor General Francis Burton Harrison, the initiation of a regular aerial taxi service, aerial advertising, and the establishment of a Peking office to assist in the introduction of Curtiss aeroplanes into China.

Liberty Flyers in Savannah
H. R. Cruikshank, of the Liberty Flyers, Inc., is working in the Daffin Park Municipal Aviation Field. William B. Staley, owner and manager of the Liberty Flyers, has closed out his business in Hagerstown, Md., and has joined the crew in Savannah. crew in Savannah.

Mr. Cruikshank is also a parachute jumper, and the company carries passengers, with Charles B. D. Collyer, chief

Mayor Learns to Fly

P. J. Moore, mayor of Twodot, Montana, is probably the first mayor to take up aviation as a sport. He has secured his license and, together with Chief of Police O. N. Rea, they are planning to promote the Twodot Aviation Company, which will engage in passenger-carrying and exhibition flying in that city. and exhibition flying in that city.

Okmulgee, Okla.-In order to accommodate aerial travel here, the Creek Aeroplane Company has been organized by a group of Okmulgeeans who now own planes. The company has leased a own planes. The company has leased a 65-acre tract near the city limits and established a landing station and built a hangar which will accommodate seven planes. An expert aviator and mechanic are employed at all times and supplies are handled so that aerial travelers can be accommodated and their needs supplied. Okmulgee has been designated an official stopping place for government planes on the Kansas City-Texas route.



The Airco 18, manufactured by the Aircraft Manufacturing Co., accommodates pilot and eight passengers. It is equipped with 500 H.P.
Napier Engine

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
Leon B. Lent, Assistant to the Second Assistant Postmaster General
in Charge of Aeronautics
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying John A. Jordan, Chief of Construction George L. Conner, Chief Clerk, Aerial Mail Service John A. Willoughby, Operator in Charge Radio Experiments Eugene Sibley, Operator in Charge Radio Maintenance and Operation



PILOTS

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellie
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I. Stanton, Superintendent New York-Washington Division George O. Noville, Superintendent New York-Cleveland Division Edward McGrath, Superintendent Cleveland-Chicago Division William J. McCandless, Superintendent Chicago-Omaha Division Harry L. Hartung, Manager, Heller Field, Newark Herbert Blakeslee, Manager, Bustleton Eugene W. Majors, Manager, College Park Andrew R. Dunphy, Manager, Chicago Maurice J. Kelly, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

**PILOTS** 

Samuel C. Eaton
Frederick A. Robinson
Elmer G. Leonhardt
Walter J. Smith
Paul W. Smith
Farr Nutter
Wesley L. Smith
Joseph P. Harris
Clayton W. Stoner
Mark C. Hogue

# Wants Americans to Start Air Fleets-Commercial Air Navigation Coming, He Says, and This Country Needs It

Washington. -- Commercial air navigation is coming and the United States must prepare to meet that issue, says Colonel William C. Hensley in a report to the Air Service of the army, from Germany.

"Airships are now possible in any kind or condition of weather," Colonel Hensley writes. "No weather conditions, except a strong-cross hangar wind, prevent the Bodensee, the commercial air liner built be received by the Toronton of the To since the armistice by the Zeppelin Airship

Corporation at Friederichshafen on Lake Constance, from making its daily flight (300 miles) to Staaken, thirteen miles from Berlin.

"Because she flies between Berlin and the natural outlet to Switzerland the ac-

commodations are at a premium.
"Commercial air navigation is coming and we must meet that issue very soon. Let us be prepared to choose our course so that we shall make as few mistakes as possible. The building up of the present small commercial enterprise in Germany has meant numerous heartbreaking experiences.

"America is by nature the chosen spot of all the world for commercial airship work with her great expanse of territory within, with her far-flung territories and insular possessions, with her commercial possibilities in Central and South America, with centers of population disposed so as to require more rapid transport than yet in operation, with her push and energy that bids for supremacy in all things good, with her supply of helium gas un-equaled in all the world, should bid strong for that which is, unquestionably, her way in the path of progress."

# UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-WASHINGTON ROUTE

Monthly Report of Operation and Maintenance

DECEMBER, 1919

			ua		uel,			7			_		SERVICE AND UNIT COST						
Aeroplane No.	Gasoline	Grease and Oil	Office Force and Watchmen	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile	
30 31 35 36 39A 43 46 47 48	\$118.24 70.00 108.90 71.68 35.88 177.44 72.24 11.20 163.04 58.50	\$20.18 8.67 19.88 9.95 1.63 39.68 -11.04 2.00 29.23 14.78	\$57.36 57.36 57.37 57.37 57.37 57.37 57.37 57.37 57.37	\$40.61 40.61 40.61 40.61 40.61 40.61 40.61 40.61 40.61	\$22.76 22.76 22.76 22.76 22.76 22.76 22.76 22.76 22.76 22.76	\$68.93 68.93 68.93 68.93 68.93 68.93 68.93 68.93 68.93	\$170.12 29.00 168.35 129.04 8.86 252.77 82.48	\$255.96 118.62 181.33 94.50 112.00 240.50 183.37 90.22 299.13 250.56	\$98.28 23.02 37.10 22.60 16.25 31.32 24.00 24.00 31.95 87.40	\$72.50 72.50 72.50 72.50 37.50 37.50 72.50 31.07 72.50 72.50 72.50	\$44.72 44.72 44.73 44.73 44.73 44.73 44.73 44.73 44.73	\$969.66 556.19 822.44 634.67 446.52 1,048.61 638.60 434.32 991.68 789.36	408 250 385 256 121 628 258 40 568 285	3 17 13 26 8	n. 1,255 220 25 1,428 21 1,090 25 125 29 2,157 20 662 1,345 21 1,345 22 1,345	3.1 .9 3.7 4.3 1.0 3.4 2.6	\$55.08 185.40 47.22 47.52 40.08 75.00 59.40 107.40	\$0.77 2.53 .58 .58 3.57 .49 .96	
49 50 94 110 111 202 44301 Total	28.28 80.92 91.48 11.76 \$1,099.56	8.40 16.46 26.40 8.11 \$216.41	57.37 57.37 57.37 57.37 57.37 57.37 \$917.89	40.61 40.62 40.62 40.62 40.62 40.62 \$649.81	22.77 22.77 22.77 22.77 22.77 22.77 3364.24	68.93 68.93 68.93 68.93 68.93 81,102.88†	10.47 53.16 54.94 25.13 46.92 \$1,263.87	40.83 72.00 91.16 . 52.30 63.00 35.00 \$2,180.48	7.55 7.75 14.50 18.45 1.00	72.50 10.00 50.00 100.00 200.00 35.00 \$1,116.07	44.73 44.73 44.73 44.73 44.73 44.73 5715.65	347.74 334.44 473.17 553.54 658.88 372.21 \$10,072.03	101 289 291 42 3,922	5 2 4	95 94 80 550 81 623 86 260 80 355	5.4 2.1 .9 8.4	309.00 85.80 97.20 253.20 76.80	3.56 .86 .89 2.53 1.05 \$0.94	

Cost per mile, overhead, \$.35; cost per mile, flying, \$.24; cost per mile, maintenance, \$.35.

\*Ran on gas put in during previous month. †Includes part of cost of moving station from Belmont Park, N. Y., to Newark, N. J.,

Note. Planes Nos. 30 to 50, inclusive (except 39-A), Curtiss R4, equipped with Liberty-12 motors Plane No. 39-A, Curtiss HA, equipped with Liberty-12 motors. Planes Nos. 94 and 110, De Haviland, equipped with Liberty-12 motors. Plane No. 111, Twin De Haviland, equipped with two Liberty-6 motors. Plane No. 202, Martin, equipped with two Liberty-12 motors. Plane No. 44301, Curtiss JN4D, equipped with Curtiss OX-5 motor.

# THE STRENGTH OF ONE-PIECE SOLID, BUILT-UP AND LAMINATED WOOD AEROPLANE WING BEAMS

By JOHN H. NELSON

THE war caused an unprecedented demand for selected spruce for aeroplane construction. The increased demand necessarily caused a greatly increased output. However, the magnitude of the requirements and methods of construction, whereby a large part of the selected stock is wasted in the construction

All beams tested were of an I section and the majority were somewhat similar in size and cross section to the front wing beam of the Curtiss IN-4 machine.

beam of the Curtiss JN-4 machine.

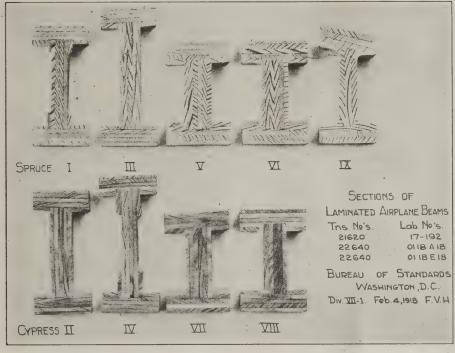
As to methods of construction, the beams may be classed as (1) solid beams cut from solid stock; (2) three-piece beams, built up of three pieces, web and

(a) Fourteen solid beams, designated by English numerals in this report, were made in the Bureau of Standards shop. The purpose of these tests was (1) to determine the suitability of fir and cypress woods for aeroplane use, compared with Sitka spruce, and (2) to determine whether a plain rectangular I-section beam possessed any advantage over the oblique I-section beam, which is used at present, other than the advantage of simplicity in shop practice.

(b) Fifteen beams were submitted for test by the Naval Aircraft Factory, Philadelphia. These beams were designated by the Roman No. I, to identify the series, followed by sub-numbers 5 to 19, to indicate the beams of the series. These beams were all built of spruce; seven were solid beams and eight were three-piece beams. These tests were made (1) to determine the advantage of the rectangular I-section over the oblique I-section, if any; (2) to compare three-piece beams with solid beams; and (3) to determine the effect of splicing three-piece beams.

(c) Twenty-three laminated beams were submitted for test, fourteen by the West Woodworking Company of Chicago, and nine by Aeronautical Equipment (Inc.), of New York City. These beams are designated by Roman numerals throughout this report. Four of these beams were built of cypress wood and the remainder of spruce; a number of the spruce beams had additional laminations of hardwood placed advantageously in the beam section. These beams were tested to determine the merits of laminated beam construction, with the view of using it as a substitute for solid beams

All beams were 90 inches long. A sketch of each beam section, giving its dimensions and properties, is shown on the following pages. Photographs are also shown of sections cut from laminated beams I to XX.



of the one-piece beams, makes the problem of furnishing sufficient selected stock a very serious one, even with the enlarged

The remedy for this condition lies either in the discovery of a perfectly satisfactory substitute for the spruce now used, or in the development of some method of construction which will conserve the present supply by utilizing more of the selected material.

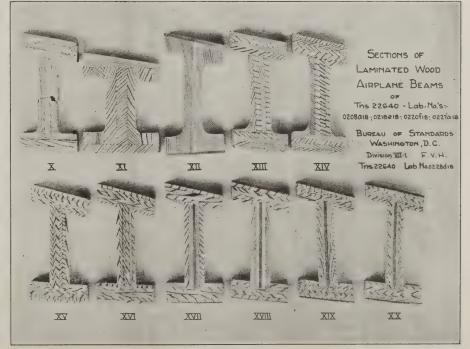
In an attempt to find a solution of the above problem, certain experiments were conducted during the past year at the Bureau of Standards. Tests were made on several of the more common woods to determine their suitability as substitutes for spruce. Further, beams built up of three pieces or of laminated construction have been tested to determine their strength in comparison with the one-piece construction.

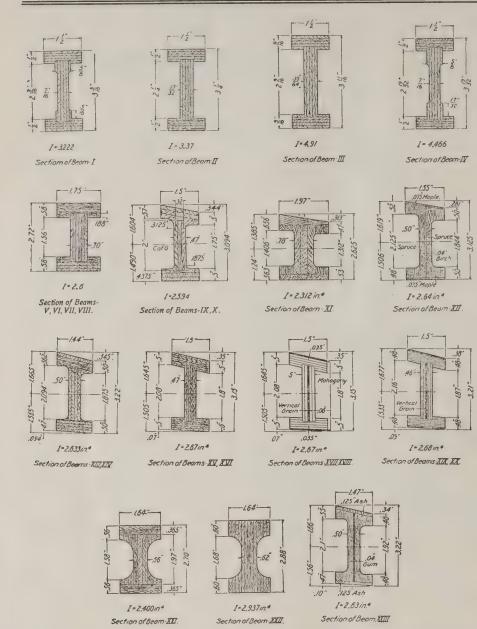
The built-up and laminated constructions eliminate the waste in the process of cutting an I section from solid timber. In such construction it is also possible to use wood in short lengths, and though the cost of manufacturing built-up beams is somewhat greater than that of producing the solid beams, the cost of the raw material utilized is much less than the cost of the carefully selected timbers used for solid beams.

The purpose of this report is to summarize the results of all wood aeroplane wing beams tested to date in the Bureau of Standards laboratory in order that the various kinds of wood and methods of construction may be compared.

flanges glued together by a tongue-andgroove joint; and (3) laminated beams built up of thin laminations of wood glued together.

This report includes three sets of test





Methods of Test

All beams were tested for transverse strength by two-point loading. Load was applied at points 24 inches from supports in an 84-inch span.

A vibratory or repeated stress test was made on beam No. X to note the effect of vibrations upon a laminated beam. The beam was loaded repeatedly to a stress of about two-thirds the elastic limit. Applications of stress occurred at the rate 74 per minute for 14½ hours. It was then loaded to rupture and the results noted.

Shear tests of glued joints were made on sections cut from a number of the first laminated beams, to determine the ability of the glue joints, between the web and flanges, to withstand shear stresses. avoid unnecessary columns of figures, the glue shear test data will be omitted from this report. The results showed the glue joint to be stronger in shear than the wood web section in the case of relatively dry test specimens, and also in the case of moist specimens exposed for four and one-half days in a humidity chamber (relative humidity 65 per cent saturation, at 65 degrees F.) before being tested.

# General Conclusions

While this report does not contain data from an exhaustive series of tests on

built-up beam constructions, it is apparent that the results obtained are conclusive enough to warrant the acceptance of certain definite conclusions. This is true not-withstanding the fact that the work was carried out under conditions which pre-cluded certain desirable scientific requirements such as identical material for all beams.

1. It is apparent that beams of fir car be produced which, weight for weight, will prove as strong as those made of spruce, but will not, however, show quite the same stiffness; further, that cypress can not be considered as a satisfactory substitute for spruce. (Cf. data on beams 1 to 15 solid beams; beams VII and VIII of laminated construction.)

On the basis of equal section moduli, the rectangular sections are stronger than the oblique sections. (Cf. data on beams

1 to 15 solid.)

3. Beams made up of three pieces can be produced which will be as strong as the solid beam construction. While these tests indicate that a larger variation in strength may be expected with the threepiece beams, such variaion is apparently not more than that which is ordinarily ex pected with wood construction. The solid beams with which the three-piece beams were compared all gave remarkably con-

sistent strengths for wood construction. 4. Beams of the laminated construction can be built which will be as strong as the

one-piece (solid) construction.

5. The details of construction employed in three-piece and laminated constructions have a large influence on the strength of

the finished beam:

(a), Three-piece and laminated beams are not weakened when properly spliced. Scarf joints only are permissible for splices. Butt joints are unsatisfactory. A suitable scarf joint is made by cutting the ends to be spliced with a slope of three-fourths in 10; these ends are then overlapped and glued. (Cf. beams I-5 to I-19 and remarks on beams I to IV, XVI to XVIII, and XXIII.)

(b) The laminations should be relatively thick and preferably not less than one-eighth inch thick. It will be noted by comparing the "specific strengths," given on summary curve, with the corresponding beam sections that the beams with thicker laminations have the higher specific cific strengths.

(c) Web and flange reinforcement of dense-wood veneers increases the strength of the beams decidedly. Many of the failures were mainly web failures, due to horizontal shearing stresses. The reinforcement of the web by a centerpiece of a dense-wood veneer having its grain placed vertical would prove efficient reinforcement against horizontal shear failures; and this fact is no doubt largely responsible for the increased strength shown by beams thus constructed. (Cf. compare beams XV, XVI with XVII and XVIII and Deam XII with XIII and XIV.)

(d) Beams of glued construction are apparently not weakened by continued vibrations. (Cf. tests of beam X.)

(e) Glued constructions are as strong in shear as the wood from which they are made, even when the beams have been exposed to moisture.

(f) Built-up beams will show stiffness equal to that of the solid beams only when the construction is of the highest type.

# Remarks on Tests

Solid beams of Bureau of Standards shop (Nos. 1 to 15).—All solid wood beams of spruce and fir (Nos. 1 to 12) failed in compression. Beam No. 2 was a poor specimen, as it contained a pitch pooket; this accounts for failure at such a low load. The solid beam of cypress wood, No. 14, failed in tension and horizontal shear. Cypress beam No. 15 failed in tension.

Solid beams from Naval Aircraft Factory (Nos. I-6 to I-11).—Each of these beams failed in compression. The compression of the second failure in beams 1.7 pression failures in beams 1-5 and 1-7 were followed by horizontal shear failures. These beams ran quite uniform, as is shown by the values for "specific strength" on the summary chart of results.

Three-piece beams from Naval Aircraft Factory (Nos. I-12 to I-19).—Each of these beams failed in compression. Failure these beams failed in compression. Failure was not due to splices in the case of the spliced beams (Nos. I-14, I-15, I-18, and I-19). While these beams do not run as uniform in strength as the solid beams above, the variation is not greater than is to be expected in wood. Moreover, the average specific strengths of the three-piece beams is a trifle greater than for the solid beams

Laminated beams.—Beams I and III of spruce and II and IV of cypress failed in compression. These beams were poorly

constructed. A number of laminations in each beam were spliced; the splices were butt joints which were not closely butted. Consequently failure in each beam oc-curred at a lamination splice.

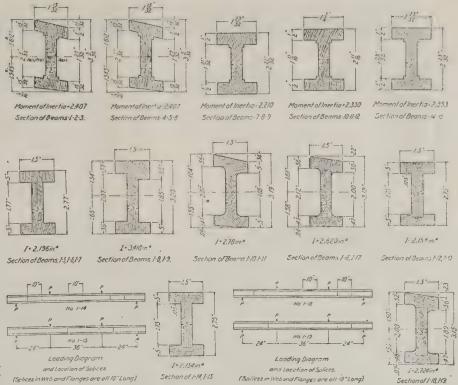
Beams V and VI were better constructed and were equal to solid wood in specific strength.

Beams VII and VIII of cypress wood failed in tension. The wood in these beams was of poor quality and appeared to be decayed.

Beam No. X failed in compression.— Beam No. X was given a vibratory or repeated stress test before being subjected to the regular transverse test. The purpose was to determine whether or not the stiffness or strength of the beam would be affected by a test of this nature. The results indicate that the vibratory test had no effect upon the beam. The vibratest tory test was not of a very severe nature. This beam failed in compression at the center, and in shear over the entire length of the web. The beam contained no splices in the laminations.

Beam No. XI was a rear wing beam of a larger section than the other beams. This beam carried an exceedingly high load.

Beam No. XII, although classed as a laminated beam, is quite different from the others. The birch lamination or veneer in the center has the grain running in the direction of the depth of the beam section. This beam was bowed laterally to the extent of 9/32 inch at the center and the left side of the section was cracked in the web from the birch veneer center to the outside for the entire length, as shown in the photograph. The left side was on



the convex side of the bow. In spite of these defects, this beam carried a very high load, which showed that this is a very good type of construction. Beams XIII and XIV both failed in

compression. While these beams were not as strong as some of the preceding ones, they are practically equal in strength to the solid wood beams.

(Continued on page 673)

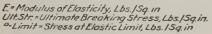
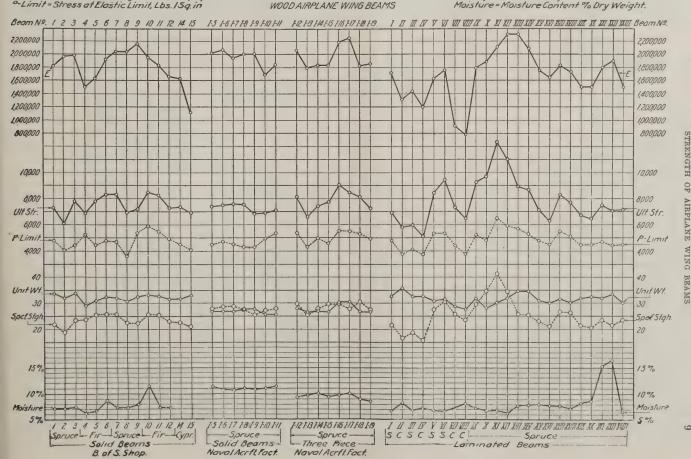


CHART SHOWING RESULTS OF TESTS WOOD AIRPLANE WING BEAMS

UnitWt=Weight of Beam, Lbs | Cu ft. Spcf Stgh=SpecificStrength=10=UttStn=UnitWt+10 Moisture=MoistureContent % Dry Weight.



Naval Acrit. Fact.

Novol Acrit Fact.

# THE NIEUPORT TWO-SEATER NIGHTHAWK

A high-speed two-seater machine adapted from the single seater Nighthawk and retaining all the important features of that machine.

The passenger is located in the forward cockpit and the pilot in the rear.

Performance.

Speed: 150 miles per hr. at 1,000 ft. Climb: 20 minutes to 20,000 ft. Maximum height: 27,000 ft. Flight distance: 400 miles.

A.B.C. Dragonfly: 320 B.H.P. at 1650 R.P.M. Petrol consumption: .6 lbs. per b.h.p. hr. Oil consumption: .03 lbs. per b.h.p. hr.

Two 16½-gallon main tanks, one at each side of the body at C.G. of machine and one gravity service tank (7-gallon) located between spars in top centre section of wings. All petrol tanks to be of the M.I.D. self sealing type.

The carbureters to be fed by gravity from service tank which latter obtains its supply from the main tanks by means of a direct pumping system.

Total petrol capacity: 40 gallons.

Oil Tanks.

Situated on top of the fuselage near the engine. Capacity: 4 gallons.

Fuselage.

Wooden structure with tie rods and simple metal fittings square in shape and smoothly streamlined off.

Total surface (including flaps): 270 sq. ft. approx. Span (top and bottom): 27' 11" approx. Chord (top and bottom): 5' 3" approx. Gap (at right angles to chord): 4' 6" approx.

Wing section R.A.F.: 15. Angle of incidence: 3°. Dihedral angle: 172°.

Top and botom (small chord type): 9.3 sq. ft. each.

Tail Plane.

Adjustable from pilot's seat. Area: 28 sq. ft. 65% fixed, 35% movable.

1 top and 1 bottom. Total area: 5¼ sq. ft.

Rudder.

Balanced type, area: 5.6 sq. ft.

Landing gear.

Vee type, built of wood with 700 m/m x 100 m/m wheels.

Single joy stick for operating lateral control and elevators; footbar for rudder and lever for adjusting tail. Control wires inside body arranged to leave central part of fuselage free. For training purposes duplicate controls can be fitted.

Centre of Gravity.

.32 to .34 of mean chord.

Total weight of machine.

2184 lbs.

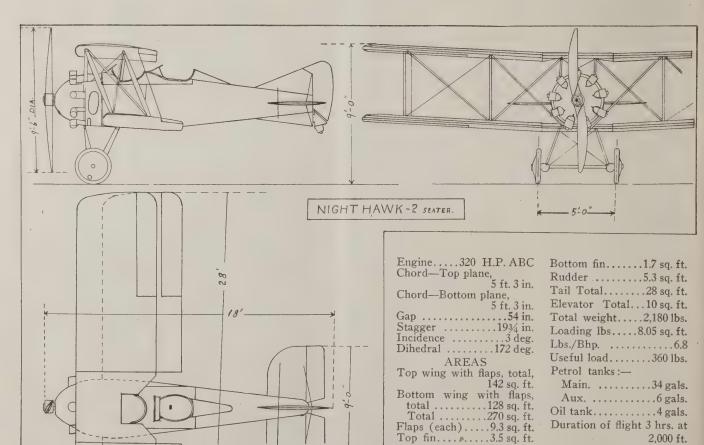
Useful load.

360 lbs.

Load factor.

Wings: Factor of 7 on front truss and 5 on rear working to a stress of 4000 lbs. per sq. inch for spruce members also a load of 30 lbs. per sq. ft. on tail with a factor of approximately 11/

Body: Factor of 5 for front portion and rear portion with landing loads. Rear portion also to have a factor of 1½ with 30 lbs. per sq. ft. down load on tail.



Landing gear and rear skid.         Factor of 4½.       Estimated Weights.         Wings       270 lbs.         Fuselage       109 "         Fins       6 "		Engine	
Tail adjuster       8 "         Tail plane and elevators       28 "         Skid       6 "         Rudder       4 "         Controls       40 "		Pilot	.360 "
Structure. On Cockpit and fittings and windscreens		Total weight	2184 lbs.
Instruments	780 lbs.	Load/sq. ft.: $\frac{2184}{270} = 8.1 \text{ lbs./ft.}$ Load/H. P. $\frac{2184}{320} = 6.83 \text{ lbs.}$	



The Nieuport Nighthawk

# WORK OF THE METEOROLOGICAL SECTION OF THE SIGNAL CORPS

The work performed by meteorological stations under the supervision of the Meteorological Section of the Signal Corps is divided into two classes: "Meteorological," that part of the work which is connected with observations on surface atmospheric conditions; "Aerological," that part of the work which is connected with upper air conditions.

The meteorological work consists in observing and recording data concerning temperature, barometric pressure, humidity, rain or snow fall, cloudiness, sunshine and surface winds. Continuous records of meteorological conditions are often kept from self-recording instruments.

kept from self-recording instruments. The aerological work consists in taking observations on upper air data. At most stations this is limited to determinations of the wind velocity and direction at various altitudes, generally known as wind-aloft data. The procedure in making a wind-aloft observation consists in allowing a small rubber balloon inflated with hydrogen to ascend freely. Observations on the position of this pilot balloon are taken at regular intervals by means of one or two specially constructed theodolites, and from the calculated path of the balloon the wind velocity and direction may be computed for each altitude

the balloon reaches. Upper air soundings of this character may be made to the limit of visibility, which averages from 6,000 to 15,000 feet, depending upon weather conditions. The highest altitude reached by this means in this service is about 12½ miles.

The principal function of the stations supplying data to the Aviation Section of the Department of Military Aeronautics is to make wind-aloft observations at regular intervals during the day or night, from which reports are submitted to headquarters, officer in charge, flying, etc. These local reports are, for purposes of local flying, more valuable than the telegraphic bulletin, as they hold good usually for several hours, and for a radial distance of twenty-five to fifty miles. Thus from frequent wind-aloft observations accurate knowledge is always on hand of atmospheric conditions aloft. From the behavior of the balloon during an ascension and other considerations the bumpiness or gustiness of the upper air is often inferred.

The telegraphic bulletins received at night, to cover the following day, are intended for use only on long cross-country flights. It is believed that these upper air bulletins will prove to be of considerable

assistance to future cross-country aviation.

With reference to the value of upper air data to aviation, attention may be called to the following facts of common observation: (1) The upper winds are practically always quite different in direction and velocity from the winds at the surface; (2) the wind velocity at altitudes as low as 3,000 to 5,000 feet is sometimes greater than 100 miles per hour with little or no indication of this state from surface conditions; (3) the wind velocity and direction are liable to sudden and large changes.

and large changes.

Meteorological data are also given in the reports sent out by the stations. Regular reports on temperature and pressure have been found to be of service, as well as frequent reports on surface wind direction and velocity. In a number of instances the records of the station proved of value for use in connection with determining the cause of accidents that occurred at the field. Meteorological data have also been employed in relation to dope and fabric tests. The meteorological personnel at several aviation training fields have been called upon to give courses of lectures in meteorology and aerology to the student aviators.

## NEW COMPUTERS FOR AEROPLANE WORK

Aeroplane Calculations may be divided into two classes:

1. Precise calculations, based on accurately assumed data, to an accuracy of, say, 1/500%, 1 part in 50,000.

2. Approximate work, based on practical data, to an accuracy of, say, 1/20%, 1 part in 2,000.

To meet these requirements two new Computers have been perfected recently. Fig. 1 shows the new Ross Precision Computer; Fig. 2, the Ross Rapid Computer.

The Ross Precision Computer solves problems like

879.65 ÷ 74.769 × 7.2638 = 85.458 to an accuracy of 5 places,—4 figures exact, and the 5th by interpolation. Heretofore such problems could not be solved in a practical way. Logarithms require 4 searches in tables, 4 interpolations, a subtraction, an addition,—and then the answer cannot be used unless checked. Longhand is out of the question. An adding machine would require 50 to 100 individual moves. A slide-rule could handle only the first 2 or 3 figures.

The Precision Computer solves this in 2 settings, thus: 1. Set 74769 under arm 4 and 87965 under arm 3;

2. Bring 72638 under arm 4; answer is under arm 3. Slide 6 points to answer, checks it, and locates decimal point.

Referring to the numbered parts in Fig. 1, the Precision Computer consists of Dial 1, which carries a 25-coil spiral with a scale of equal parts around the rim; Disk 2 forming the frame, a stationary hair-line 3, a floating hair-line 4 attached to Disk 2; a Thumb-nut 5 to lock Disk 2, and a simplified, auxiliary slide 6.

The Slide may be used alone, without the Dial, for approximate calculations. On the back are natural trigonometric functions, graduated to 2 minutes of arc, and interpolable to fractions of a minute. A Clamp (not shown in Fig. 1) con-

verts the Computer instantly into a Desk Attachment, increasing its rigidity and accuracy, and permitting it to be operated with one hand.

The Ross Precision Computer handles constant factors with especial facility; it reads directly 5-place logs and antilogs, solves exponential expressions and problems of the form abcd/efgh; handles traverses and other trigonometric problems to an accuracy better than 1 minute of arc, 1 inch per mile.

The instrument is made of metal; has no glass parts; precisely machined, like a compass or transit; the Dial is also of metal, beautifully engraved; nine inches in diameter; weighs slightly over a pound; packed in fine case, with full directions.

The Ross Rapid Computer has two main features:

1. Simplicity.

2. Completeness.

It consists of dials 1 and 2, Fig. 2, and a reading-arm 3 lockable by Thumb-nut 4. To multiply or divide, set your problem under arm-line 3; large arrow shows answer, small arrow shows proof.

The Rapid Computer gives an average accuracy of 1/20%, 1 part in 2,000 reading 3 to 4 significant figures, like:

 $23.67 \times 8.62 = 204.0$ , or  $23.67 \div 8.62 = 2.746$ 

Application of Rapid Computer to typical aeroplane calculations:

Ex. 1. Convert miles per hour to meters per second. Set arrow against constant 0.447; opposite any miles per hour on scale D read meters per second on scale N. Makes other conversions as readily.

Ex. 2. Find total resistance, or Drift D, by formula D =  $\alpha$  .0001 V<sup>2</sup>N, where:—

V = vel. in miles per hour,

 $N = 30S + \alpha \cdot \sin \alpha \cdot A$ , A = plane area in sq. feet. S = equivalent area of body, struts, etc., sq. ft.,

 $\alpha=$  degrees inclination between plane and its motion. Set  $\alpha \times \sin \alpha$  under arm, opposite A read value of  $\alpha \cdot \sin \alpha \cdot A$ ; add 30S to find N. Set  $V \times V$ , opposite N read final answer.

Ex. 3. Knowing Drift D, find HP required, by formula HP = VD/375. Set  $V \times D$ , opposite 375 read HP.

The Rapid Computer solves problems of 3 factors with a single setting, and those with 4 or more settings,—with but one additional setting for each additional factor,—like abcd, or ab/cdef, etc. Each setting is effective, and any trigonometric or logarithmic factor may be substituted in place of a number in the expression abcd, or ab/cdef, by merely using the appropriate scale.

It handles constants effectively; can be used for measuring horizontal and vertical angles; solves all trigonometric problems.

The scales are as long as the lower scales of a 20-inch rule, or as the upper scales of a 40-inch rule; has direct and inverted scales. In working such a chain of calculations the intermediate settings cannot shift accidentally, however long the operation. The answer can generally be read at two points,—which, by the double vernier principle, eliminates personal and instrumental errors.

The Rapid Computer is 8" in diameter, is made of weather and wear-proof celluloid, with a clamped metal arm to lock settings; weighs about half a pound and is packed in fine case with full directions.

These Computers are made and marketed by the Computer Mfg. Co., 25 California Street, San Francisco.

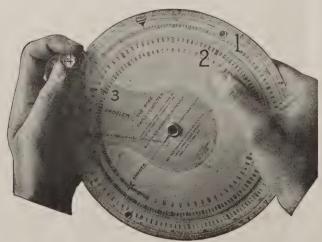


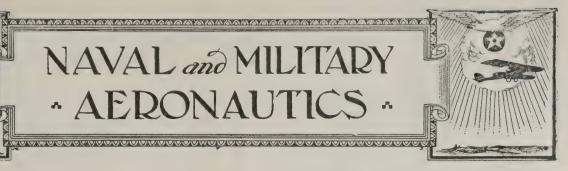
Fig. 2. Ross Rapid Computer



Fig. 1. Ross Precision Computer



# NAVAL and MILITARY **AERONAUTICS**



#### Latest Type German Fokker Planes Arrive

Twelve German Fokker aeroplanes of the very latest type have been received at the Aviation Repair Depot at Indianapolis, Ind. These machines were turned over to the United States Government in connection with the terms of the armistice. Practically all of these machines were flown from the interior of Germany to the various supply depots in France and then torn down and shipped to this country.

The machines received at Indianapolis have caused a great deal of speculation among the flying officers, particularly as to their efficiency in flight, and great admiration is manifested by all who fly these aeroplanes because of the excellent workmanship and ingenious welding of

metal parts.

The Mercedes engines in these planes were torn down and were given a minute inspection. They were found to be in perfect condition notwithstanding the rough handling in bringing them to this

country. All machines will be examined thoroughly and put in perfect condition.

#### Air Service Stock Keepers' School

Air Service Stock Keepers' School
Recently a school for the instruction
of enlisted men in stock keeping was
opened at Wilbur Wright Air Service
Depot at Fairfield, Ohio.
The purpose of organizing a stock
keepers' school for enlisted men is to
give these men a thorough training to accurate and intelligent record keeping. The men are being instructed on the various types of aeroplanes, spares, and motors in stock and also the systematic handling and checking up of material. The personnel under the instructions have done very well notwithstanding the fact that there is but limited space available to conduct the school. The instruction these men receive will be a valuable asset to them when they return to civil life.

#### Fourth Aero Squadron Sails

The Fourth Aero Squadron, one of the latest aero units to be assigned to terri-

torial duty, left San Francisco January 15 for Luke Field, Honolulu.

Among the flying personnel who sailed on the transport Matawaska were Lieutenants Marion Elliot, E. H. Manzelman, G. E. Rice, John J. Curtiss, V. Foster and Thomas Brooks.

#### Navy Aviation Notes.

Efforts are being continued by the the "B" cargo ships, of 10,000 tons, now building at Hog Island for the shipping board. The navy wants them for use as aircraft tenders, for which there is so great need. Consideration also is being given to conversion of the collier Neptune into an aeroplane-carrier. Another project on hand by the navy air service is to obtain transfer from the War Department of Chapman field, near War Department of Chapman field, near Miami, Fla., If this field is obtained as a result of the negotiations now under way, there will be consolidated at that place the personnel and material of the navy air service now at the naval air stations at Miami and Key West. Lieut. Comdr. Wadleigh Capehart, who has been on aviation duty with the Brazilian government at Rio de Janeiro, now is in this country. He reports that the is in this country. He reports that the Brazilian army and navy are evincing great interest and considerable progress in aeronautics. The question whether Lieut. Comdr. Capehart shall return to Brazil or another officer of our navy sent there is under consideration.

#### Ninety-sixth Squadron to Train for Day Bombardment Work

The 96th Aero Squadron, having been relieved at Fort Bliss, Texas, by the 12th Aero Squadron, recently entrained for Kelly Field, where it will undergo an intensive course in day bombardment.

This squadron was the second Air Service unit to be placed on the border and move? to Fort Bliss on July 3, 1919. On August 1, 21 aeroplanes, all in crates, were assigned to this squadron and the work of setting up these planes was immediately begun. On August 9, enough

DH-4s had been assembled to take over the border patrol from Fort Bliss to Nogales, Arizona, a distance of 350 miles. The afternoon of August 9, 1919 Flight A made the first Nogales Patrol. This patrol has been made daily by Flight A since that time. The monument Forty and Douglas patrols have been made on alternate days by Flights A and B.

During the stay on the Border planes from this Squadron have flown over four-

teen hundred hours without one injury teen hundred hours without one injury to pilot or observers. In addition to patrolling the Border, this Squadron furnished teams for Cavalry contact with Cavalry at Fort Huachuca, Arizona, the 1st Cavalry at Camp Harry J. Jones, Douglas, Arizona, the 12th Cavalry at Camp Shannon, Hachita, N. M., the 12th Cavalry at Camp Furlong, Columbus, N. M., and with the 5th and 7th Regiments of Cavalry at Fort Bliss Texas. Infanof Cavalry at Fort Bliss, Texas. Infantry maneuvers were carried on with the 24th Infantry at Camp Furlong, Columbus, N. M., and with the 19th Infantry at Camp Harry J. Jones, Douglas, Arizona. Observation of Field Artillery Fire was carried on with the 82nd Field Artillery at Fort Bliss.

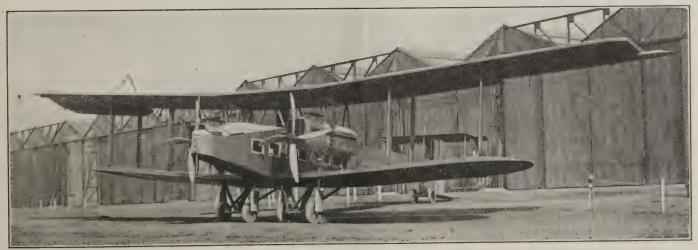
A school for observers was conducted

A school for observers was conducted and pilots were trained to do observing work. In connection with the school the following air work was done:

Practice Photography Missions. Practice Gunnery with forward and flexible guns. Bombing with dummy and live bombs. Visual reconnaissance missions. Simulated artillery shoots. Simulated contact with cavalry and infantry. Radio practice, telegraph and telephone. Formation flying Practice reading signals sent tion flying. Practice reading signals sent from the ground by DR system of signalling.

#### Aviation Mechanics' School Again Active

The Air Service Mechanics' School at Kelly Field, Texas, is again in operation due to the arrival of one hundred and sixty students. These men have all been examined for their qualifications to follow the trade. They will graduate in three months time as aeroplane and motor mechanics.



Three-quarter front view of Handley-Page twin-Rolls engined passenger machine



# FOREIGN NEWS



#### Air Service for Lima

Lima, Peru.—Negotiations between the Vickers company and the government for the establishment of a regular aeroplane service between Lima and Payta, on the coast north of here, and Iquitas, on the eastern slope of the Andes, are under way.

Aeroplane Factory Planned for Chili

Aeroplane Factory Planned for Chili

Valparaiso, Chili.—Proposals to the Chilian Government for the establishment of an aeroplane factory in Chili, by an English firm, and the organization of a postal service between the principal cities are meeting favorable reception at the hands of Government officials.

A detailed report on the project has been forwarded to the Government Finance Minister by Gen. Don Pedro Dartnell, following careful study of the plans as outlined by the John Thomas Aircraft Manufacturing Company. In his report the General gives detailed economic, commercial and military reasons for favoring the undertaking.

"The introduction of this new branch of enterprise into Chili would undoubtedly stimulate a number of the national industries," comments the paper, "and at the same time find employment of a skilled kind for many hands, while it would also mean the introduction of not less than \$\$2,500,000 capital.

"The military air service would benefit by being made independent of material imported from abroad, with the establishment of an efficient postal service throughout the country population."

Well organized steps to incorporate aviation in the development of their resources are now being taken by eight of the South American republics. Flying is being extensively employed for military and naval purposes, and it is expected that aviation to carry passengers to outlying mines and ranches will soon be developed on a large scale, as at present transportation by rail, water and pack animals is extremely slow and difficult.

According to a foreign aeroplane representative, Brazil has done more than any other South American country toward the development of aviation. Plans are now under way for the establishment of several mail routes and for transportation up and down the Brazilian coast some 1,000 miles, while several planes have been sold for private use. In Uruguay and Argentina Government air schools have already been established for both naval and military pupils, while along commercial lines

#### The Vickers Chinese Contract

The contract for aeroplanes secured by the Vickers Co. from the Chinese Government appears to have caused a fluttering in the dovectors in the United States. At any rate, a message from Peking makes it appear that the American Legation has protested to the Chinese Foreign Office against the Vickers contract on the ground that 10 years' preference on the supply of similar aeroplanes is opposed to equal opportunity for other countries.

#### Bombay-Karachi Aerial Mail

Arrangements have been made for the inauguration of a weekly aerial mail service between Bombay and Karachi and vice versa in connection with the English mail. Letters should have the words "Bombay Karachi Air Service" written in the top left-hand corner, and the special fee is 1s. for each ounce or fraction of an ounce, in addition to the ordinary postage. The letters may be posted at any post office in the U. K.

#### A Lady's Flight to Morocco

A French bride arrived at Rabat, Morocco, on December 19, having travelled as a passenger on a 300 h. p. Breguet, piloted by her husband, Lieut. Daurat, from Toulouse. The distance is roughly 1,150 miles, and the route followed was via Barcelona, Valencia, Alicante, Granada, Malaga and Tangier. She claims to be the first woman to fly from France to Morocco.

Prince Loops the Loop

During his recent visit to France, Prince Eric of Denmark, with
two Danish officers, went out to the Villacoublay Aerodrome and saw
the aviator Fronval give a display on his Farman machine. Later
Prince Eric ascended with Fronval and looped the loop several times.

#### Aviation at the Fêtes de Paris

In connection with the Fêtes de Paris it is proposed to hold competitions for aeroplanes at Juvisy on May 22 and 23. The classes include those for single-seaters, two-seaters and multi-seaters fitted with one or more engines, and only French-built machines will be eligible while pilots must have taken the French military brevet.

#### Seaplane Contests at Antwerp

Arrangements are being made to hold competitions for seaplanes at Antwerp during the second fortnight in July. There will be two main divisions: with tests for speed and weight-lifting, and other points which will be observed will be endurance, security and flotation. There will also be two contests for machines specially designed for colonial use, and the winners, besides receiving cups, will be purchased.

#### Peruvian Coastal Service

Under the auspices of the Peruvian Corporation, Handley Page will inaugurate a coastal hydroplane service, reports *The Times* correspondent at Lima. One pilot and three mechanics arrived in the *Ortega*, and two hydroplanes and the second pilot are expected in a fortnight. The first service will be established between Callao, the summer resort of Ancon, and Port Salaverry.

#### Air Services in Argentina

A regular air service has been inaugurated between Buenos Aires and Montevideo by members of the French Aviation Mission which has been in Argentina for some time with the object of organizing such services in various parts of the country.

M. Fokker continues to keep himself in the limelight. It is now stated that he has drafted the plans of, and will shortly begin building, a large passenger aeroplane capable of carrying 60 passengers. The machine, intended for long overland flights, will have six motors, which it is hoped will give it a speed of 75 miles an hour. Sleeping berths and a smoking room are to be constructed under the planes.

A proposal has been made by the Norwegian Aircraft Commission that concessions for aircraft within Norwegian frontiers should be only granted to Norwegian companies, with certain reciprocal exceptions.

#### German Commercial Flying

"It is reported that German aviation is to be resumed, after several weeks' interruption due to fuel shortage," writes The Times correspondent in Berlin. "Passenger services are being established throughout the country.

"The future of aviation, and especially the question of nationalization, is receiving much attention in some organs of the German Press. The Post's correspondent urges that it is not a matter for towns but for the Empire, otherwise he sees danger of Germany's being flown over by Entente airmen at Germany's expense, as indicated in the case of the Hattersheim aviation ground, near Frankfurt-on-the-Main, which has cost 10 million marks, and has been built at Germany's expense. "The General Air Service Co. writes that the development of Germany's air service is completely dependent upon its being linked with the International Service, since it is in the nature of this service that it can only acquire importance if applied to long distances and especially sea routes."

#### Another Flight to Australia

Lieut. H. Parer and Lieut. J. McIntosh, two Australian flying officers, left Hounslow recently on a D.H. 9 aeroplane for Australia.

The flight is in the nature of a private sporting attempt, and the officers have on board a present for the Premier of New South Wales.

#### Mexico

According to information from Mexico City, Senr. Felix Palavicini, the publisher of "El Universal," has applied to the Secretary of Communications for permission to establish an aerial delivery service for his newspaper to Pachuca, Toluca, and Puebla.

#### Spanish Aero Schools

Madrid.—The government will open five new schools of military aviation. One hundred and thirty student fliers will be enrolled, of whom 20 per cent will be non-commissioned officers and privates.

#### An Aero Club in Cape Town

An Aero Cub in Cape Iown

A letter from South Africa states that Captain Hemming, late R.F.C., who has been doing a considerable amount of flying in the Cape Colony of late, has been endeavouring to form in Cape Town an aero club for flying officers returned from overseas.

There were very many South Africans in the R.F.C., and some in the R.N.A.S., and of these a large number came from the Cape Town district. One hopes therefore that Captain Hemming's effort will succeed and that the club will be a great success.

#### Aerial Routes in Italy

Aerial Routes in Italy

Surveying the air routes is continuing methodically. Two officers in a S.V.A. aeroplane are making photographic maps of all the regular intended landing-places along the main routes and all possible-looking places round about the surveyed routes. This work evidently requires much time spent on it, depending on the weather and the seasons.

Once the photos are complete, the suitability of these possible-looking sites will require investigation as to their utility for large and small, fast and slow, aircraft. The Aerial Guide Book will require to be considerably more accurate and informative as to land conditions than ever was the Road Guide Book of former days.

#### Swiss Company Uses Latest Monoplanes.

Swiss Company Uses Latest Monoplanes.

A new Swiss company, has been formed with the object of encourageing private and commercial aviation in Switzerland. A number of Dornier hydroaeroplanes are at present in use.

The machines are all-metal wireless monoplane flying-boats and have an enclosed cabin to hold eight passengers in the nose of the boat, above which the pilot sits. Two 270-h.p. Maybach engines are carried in a central power egg over the main plane, and drive a pusher and a tractor airscrew in tandem.

Later on machines will be provided for Lausanne, Geneva, Lugano, Lucerne, Romanshorn, Neuchatel, and Rorschach, and still later the company hopes to be able to buy aeroplanes to serve the various towns that are inacessible to hydroaeroplanes.

The aviator Compte has already made several flights from Zurich to St. Moritz, carrying passengers who wish to view the mountains from above.

#### Poulet Back in France

Paris,—Lieutenant Etienne Poulet, the French aviator who started some time ago in an attempt to fly from France to Australia, accompanied by his mechanician, Benoist, arrived at Marseilles on board

panied by his mechanician, Benoist, arrived at Marsenies on board a steamer.

Poulet had remained at Rangoon for more than a month owing to his machine having completely worn out during the flight from Paris to that place. Another plane was shipped to Rangoon recently.

The opinion is expressed in aerial circles in Paris that Poulet and Benoist made the trip to France to raise additional funds. The expectation is that they will return to Rangoon and resume the flight.



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon астосторинальный попринальный пробе 🗻 🤏 запосный называют стана запеченая с



#### Designing a Model Aeroplane

Excerpt from F. J. Conner's book on Model Aeroplanes

Although it is unnecessary to go deeply into mathematical calculation when designing a rubber-driven model, owing to the ease with which the power unit can be varied, it would be fallacious, indeed, to assume that it is possible to design a successful machine without recourse to some of the essential rules which have been established in relation to models; so that we will proceed to consider the application of a few

elementary calculations necessary in model aeroplane design. For the purpose of illustration we will suppose that the rules of a competition restrict machines to a minimum weight and loading of 10 oz. and 5 oz. per sq. ft., respectively. Clearly, then, the area of the model's *supporting* surface must not exceed 10/5=2 sq. ft., or 288 sq. ins. The next point to be determined is the ratio of areas. This is largely dictated by the type of machine, a much lower ratio of areas being employed on tractors than with canards or tail-first models; but for the present purpose we will take a ratio of 5:1; we now divide 288 by the sum of 5 and 1, thus obtaining 48 sq. ins. as the area of the smaller surface. Subtracting this from 288 it follows that the remainder is the area of the main surface or surfaces. Now the area of a wing is the product of same without the purpose of same will take a ratio of 5:1; we now divide 288 by the sum of 5 and 1, thus obtaining 48 sq. ins. of span X chord. By reversing this process, then, we arrive at the linear dimensions of the plane. Assuming that we desire an aspect ratio (obtained by dividing the span by the chord) of 6:1, and putting x equal to the chord of the wing, we have:

Area of wing= $6x \times x = 6x^2$ .  $6x^3 = 288 = 48 = 240$ . Dividing throughout by  $\sin \dots x^2 = 40$ .  $\therefore x = \sqrt{40} = 6.33$  approx.

By multiplying 6.33 by 6 we get the span, 37.95, or 38 ins. approximately. With regard to the aspect ratio of the smaller surface, here again the type of machine is the deciding factor, a very low ratio being used on tractors to enable a suitable shape to be imparted to it. It should be remembered that the lift of a plane (or aerofoil as it should be more correctly termed) varies directly as the angle and

the square of the velocity, so that by doubling the angle on the wing we double the lift; double the velocity and we get four times the lift. But if we halve the speed the lift is reduced to one-fourth. For rubber-driven models, however, the angle should never exceed 6° (in most cases 3° will be found sufficient), a marked loss in efficiency being apparent when a greater angle is used.

Two more points in connection with aerofoils. Firstly to satisfy the laws governing longitudinal stability, the leading surface must always have a greater angle of incidence than the rear one. Secondly, for single screw models, a dihedral angle of at least 3° must be placed upon the main plane to resist the torque or tendency of the air screw to capsize the machine in the opposite direction to which the air screw is revolving. Incidentally, it may be stated that the National Physical Laboratory have found that the lift of a plane is not noticeably impaired with dihedral angles of a plane is not noticeably impaired with dihedral angles up to 3°

up to 3°.

From the weight carried per sq. foot of surface another important point results—the speed at which the model will require to be driven in order to fly. In the table appended to this chapter the speed in miles per hour and feet per second for various loadings is given. The table was not compiled by the writer, but the speeds for the different loadings have vied very approximately with some calculated from my own models, so that it can be taken as fairly accurate.

Since we know the speed in feet per second at which the model must fly, it follows—does it not?—that this speed is equivalent to the air screw pitch (less a certain amount for "slip") multiplied by the revolutions per second. Hence it would be useless to fit a screw whose practical pitch, multiplied by the r.p.s., fell short of this measurement. To be on the safe side it is best to make a fairly liberal allowance for slip, say from 20 to 30 per cent. The actual amount of slip can only be found by experiment, and it by no means follows that a screw giving a low slip percentage on one follows that a screw giving a low slip percentage on one model will give the same on another. There is the all-important question of head resistance to be taken into consideration, and the comparative efficiency of the planes, etc. (To be continued)

Model Aeroplane Flyers of Los Angeles, California, Lined up for The start of A race





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

#### Cadet Ten Commandments

1. Thou shalt have no other emblem indicating thy rank

except a white hat band.

2. Thou shalt not wear any silver wings on thy sleeve nor on thy breast, to lead astray the hearts of young maidens, nor shalt thou brag to them about the aerial achievements.

3. Thou shalt at all times be present at formations and

answer promptly to thy name.

4. Keep thy bunk, locker and floor in thy immediate vicinity clean and in good order, lest thou get the dreaded demerits.

5. Honor thy superior officers that thy days may be long as

a Cadet.

Always exercise carefulness in cranking an airplane. Say unto caution, "Thou art my sister," and, unto watchfulness, "Thou art my kinswoman." For many are the accidents that befall the unwary and their days are filled with lamentations.

7. Five days in the week shalt thou labor and do thy work and on the sixth day thou shalt be ready for inspection. Thou, and thy clothes, and thy bunk, and thy floor, yea even all that is thine shalt be scrupulously clean, yea even the moldings

on thy wall shalt be dusted.

8. When thou goest on leave remember thou art a Cadet, and walk not in the ways of evil; neither forget thou to return on time; for thy pass may be denied thee indefinitely and dates with thy damsels be broken.

9. When thou entereth the barracks at night remember thou

thy weary companions, disturb them not in their sleep; for their bones are weary from labor and sweet are the slumbers

of the brave.

10. Apply thy heart to instruction and thine ears unto the words of thine officers; for happy is the man who obeyeth orders and he who hardeneth his heart shall fall into mischief. Cadet Samuel Levine, more familiarly known as "Shimmie"

#### MAYOR HYLAN'S SKY COPS.



#### Well Said

In the scrimmage the veteran airman was knocked down and trampled on.

"Stand back there!" shouted the benevolent stranger; "give

him air and hurry up with the brandy."

"Never mind about the air," whispered the patient in a weak voice.—Argonaut.

#### Little Daubs of Powder

Aviator—"Who was that new girl I saw you with last night?"

Balloonist-"That wasn't a new girl. That was my old girl painted over."-Legion Weekly.

#### **Enlist Today**

I've a roofless outdoor shower, Its walls are flowering shrubs; It has no nickel fixtures; Nor white enameled tubs.

But joy is mine when there I bathe Beneath the sunny sky. I'm just as safe as safe can be— Except—when BIRDIES spy.

But each new era brings its woe, As well as wonders new.
Sometimes the planes fly low o'erhead.
Oh, dear, what SHALL I do?

-Elsie Long.

#### Not an Aviator

A Swede came down from the woods and, entering a saloon, called for a drink of good old squirrel whiskey. Said the bartender:
"We're all out of squirrel whiskey, but we've got some good

Old Crow.

"Yudas Priest!" exclaimed the Swede, "I do not want to fly, I just want to hop around a little."—American Legion.

#### Some Landing

That was an accomplished colonel (he must have been a regular) who is mentioned in the account of an aviation meet in these words: "A steep dive, a dizzy volplane, and Colonel Blank landed on the smooth field in six graceful bounds."

#### Up in the Air

The Magistrate—What's the charge against this man, officer?

The Air Cop—He was speeding in a high-power racing 'plane and ran down a child's goplane.—Tail Spins.

#### Not Needed

Aviator-I have here a device which will revolutionize the

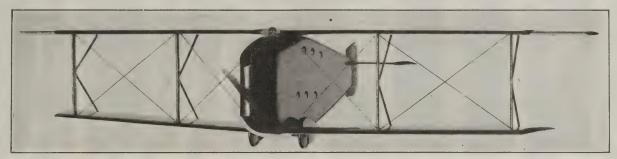
Uncle Eben-Better cut it out. There is too durn many revolutions going on now.—Judge.

LVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS (

# EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

# "World's Most Efficient Aeroplane"

Ten passengers, 1000 miles non-stop, one motor



MARTIN RECONNAISSANCE FIGHTER

Designed especially for the Liberty Motor in collaboration with the leading designers of England

Double utility is claimed for this plane over its next best competitor. Official reports show a lift-drift ratio of nine at 126 miles per hour, whereas the best obtainable by rival types at like speed is less than five.

Loaded only nine pounds per square foot of area this plane has a useful load of 3,300 lbs. (Total weight 5,553 lbs. loaded.) This means it can carry ten passengers for 1,000 miles without

The distinctive patented features which give this plane its surpassing performance are as

The Retractable Chassis which eliminates 18% of the useless or structural resistance of the average aeroplane, and enables the pilot without effort to vary the position of the wheels according to the character of the landing field.

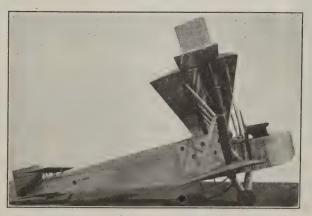
The K-bar Cellule Truss which trusses lift and drift stresses directly without bridging them

and eliminates half of the useless or parasite resistance of the Cellule Truss.

The aerofoil type fuselage which affords the pilot a position of commanding vision, having no "blind spot," and also provides commodious accommodation for ten passengers sitting two abreast. This fuselage has the remarkably low resistance of  $K_x = .00029$ .

The Wing-end ailerons four times as efficient as the trailing-edge ailerons and leaving the main wing unimpaired.

The Shock Absorbing Rudder which reduces the empennage resistance and has been found in practice to greatly facilitate maneuverability both on the ground and in the air.



MARTIN TRANSMISSION BOMBER

War time restrictions regarding the secret features of this remarkable plane are now removed. Manufacturing rights for this plane for commercial purposes are offered to any responsible company. Engineering and supervision can also be supplied to capital desiring to enter the promising field of aeroplane manu-

# The James V. Martin Enterprises

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Dayton, Ohio

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

#### 672

# THE MACHINE YOU WILL EVENTUALLY FLY!!



MARYLAND PRESSED STEEL CO., (AIRCRAFT DEPT.)

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299 MADISON AVE., NEW YORK CITY

# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"-left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



 When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circum-aviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

## The Glenn L. Martin Company

Cleveland

Contractors to the U.S. Army, Navy and Post Office Departments,

FIRST IN WAR

FIRST IN PEACE

Quality Tells in the Long Pioneering Flights

Beams XV and XVI were not as strong as solid wood beams. This was evidently due to the facts that the lamination splices were poorly made and that the laminations are too thin. Failure occurred at

lamination splices,

Beams XVII and XVIII are equal to solid wood beams. These two beams consolid wood beams, These two beams contained poor lamination splices, practically the same as beams XV and XVI. The superiority of these beams over beams XV and XVI was due to the mahogany caps on the top and bottom and the mahogany capses in the center. Evilure occurred at veneer in the center. Failure occurred at lamination splices.

Beams XIX and XX were inferior to solid wood beams even though they had mahogany caps and veneer. This is unmahogany caps and veneer.

mahogany caps and veneer. This is undoubtedly due to the fact that the laminations were too thin. Beam XIX failed at a lamination splice, but XX did not.

Beams XXI and XXII were built similar to beam XI. Both failed in compression; failures occurred very slowly. These beams were both inferior to solid wood beams. This was probably due to the high beams. This was probably due to the high moisture content, as is shown on the chart of results.

Beam No. XXIII was built similar to beam XXII, and in addition each half of

the section was spliced, splices being located at points of maximum moments. This beam proved to be inferior to solid wood beams due to poorly selected wood and not to the fact that it contained splices. The spruce wood was grained diagonally, the grain sloping 1 in 10; the veneer was soft gum wood having a low shear strength; and the caps were of ash, which is not suitable for this purpose. which is not suitable for this purpose. The results of this test demonstrate that this type of beam can be spliced without

causing a weak point.

REPORT No. 35, NATIONAL ADVISORY

COMMITTEE FOR AERONAUTICS.

#### SUMMARY OF TESTS ON SOLID-WOOD AEROPLANE BEAMS

(Each beam 90 inches long, tested for transverse strength by loading at two points 24 inches from supports in an 84-inch span.)

		Per cent. moisture	Weight (pounds	Area of	Moment of	Section	Load P	(pounds)	Fiber stress (lbs. sq. in.)		
No.	· Kind of Wood		per linear foot)	(square inches)	inertia (in.4)	modulus (in.3)	At P limit	Ultimate	At P limit	Ultimate	
1 2 3 4 5	Sprucedodo	7.3 7.2 7.5 6.3 6.7	0.550 .525 .550 .475 .508	2.362 2.362 2.362 2.362 2.362 2.362	2.407 2.407 2.407 2.407 2.407	1.494 1.494 1.494 1.494 1.494	300 250 275 325 275	450 375 485 430 485	4,820 4,010 4,420 5,220 4,420	7,230 6,020 7,800 6,900 7,800	
6 7 8 9	do Spruce do do Fir	8.7 7.2 7.2 7.6 11.6	.533 .566 .542 .575	2.362 2.542 2.542 2.542 2.596	2.407 2.210 2.210 2.210 2.330	$egin{array}{c} 1.494 \\ 1.665 \\ 1.665 \\ 1.665 \\ 1.735 \\ \end{array}$	300 325 250 375 425	520 575 475 500 610	4,820 4,690 3,600 5,400 5,880	8,350 8,300 6,850 7,200 8,450	
11 12 14 15	do		.575 .558 .563 .584	2.596 2.596 2.574 2.574	2.330 2.330 2.353 2.353	1.735 1.735 1.730 1.730	400 350 325 300	600 525 525 500	5,530 4,840 4,510 4,160	8,300 7,260 7,290 6,940	

#### TEST DATA OF SPRUCE WING BEAMS

· (Tested for Naval Aircraft Factory. Each beam 90 inches long, tested for transverse strength by loading at two points 24 inches from supports in an 84-inch span.)

No.	Weight (pounds	Area of section	Per cent.	Moment of	Section	Fiber stress (lbs. sq. in.)		
	per linear foot)	(square inches)	moisture	inertia (in.4)	modulus (in.3)	At P limit	Ultimate	
I-5.	0.442	2.380	11.2	2.196	1.585	4,550	7,400	
I-6.	.439	2.380	10.8	2.196	1.585	4,700	7,550	
I-7.	.440	2.380	10.5	2.196	1.585	4,550	7,600	
I-8.	.543	2.840	11.0	3.418	2.220	4,320	7,540	
I-9.	.538	2.840	10.7	3.148	2.220	4,320	6,860	
I-10	.448	2.500	11.0	2.780	1.700	4,940	6,970	
I-11.	.442	2.500	11.4	2.780	1.700	5,300	7,050	
I-12.	.456	2.375	9.2	2.154	1.566	5,370	8,140	
I-13.	.430	2.375	9.6	2.154	1.566	4,220	6,600	
I-14.	.445	2.375	10.0	2.154	1.566	4,980	7,400	
I-15	.434	2.375	9.3	2.154	1.566	4,600	7,710	
I-16.	.530	2.525	9.8	2.820	1.750	5,490	9,060!	
I-17.	.530	2.525	10.0	2.820	1.750	5,490	8,440	
I-18.	.464	2.513	8.9	2.724	1.700	5,300	8,050	
I-19.	.464	2.513	8.5	2.724	1.700	4,940	7,200	

#### SUMMARY OF TETS ON LAMINATED AEROPLANE BEAMS

(Each beam 90 inches long, tested for transverse strength by loading at two points 24 inches from supports in an 84-inch span.)

		Per cent.	Weight (pounds	Area of section	Moment of	Section	Load P	(pounds)	Fiber stress (lbs. sq. in.)		
No.	Kind of Wood	moisture	per linear foot)	(square inches)	inertia (in.4)	modulus (in.3)	At P limit	Ultimate	At P limit	Ultimate	
IIIIVV.	Spruce Cypress Spruce Cypress Spruce	6.79 8.25 6.54 7.35 6.66	0.610 .665 .690 .656 .654	2.674 2.695 3.093 2,879 3,121	3.222 3.370 4.910 4.466 2,600	2.022 2.073 2.661 2.842 1,912	400 325 450 375 425	585 500 650 525 670	4,740 3,770 4,060 3,620 5,340	6,940 5,800 5,860 5,060 8,420	
VI VIII VIII IX	do Cypress do Spruce do	8.05 7.22 6.76	.674 .620 .596 .540 .483	3.121 3.121 3.121 2.495 2.480	2.600 2.600 2.600 2.594 2.600	1.912 1.912 1.912 1.616 1.625	425 350 300 350 325	750 585 523 620 654	5,340 4,400 3,770 5,200 4,800	9,420 7,340 6,560 9,200 9,660	
XI XIII XIV XV	dodododododododo	6.89 6.36 7.89 7.89 8.00	.675 .566 .590 .590	3.245 $2.544$ $2.451$ $2.451$ $2.412$	2.312 2.640 2.633 2.633 2.670	1.670 1.631 1.580 1.580 1.624	450 400 375 350 325	859 746 589 575 485	6,460 5,890 5,690 5,310 4,810	12,350 11,000 8,950 8,740 7,170	
XVI XVII XVIII XIX XX	dodododododododo	7.89 7.78 7.35 8.26 8.64	.501 .529 .500 .525 .529	2.412 2.412 2.412 2.366 2.366	2.670 2.670 2.670 2.680 2.680	1.624 1.624 1.624 1.600 1.600	300 375 350 300 300	425 565 527 450 437	4,440 5,550 5,170 4,500 4,500	6,280 8,350 7,790 6,750 6,560	
XXI XXII	dodo	15.50 16.50 6.65	.632 .725 .508	2.845 3.135 2.450	2.400 2.937 2.630	1.780 2.040 1.585	350 375 300	553 598 465	4,720 4,420 4,540	7,460 7,050 7,040	





THREE SEATER—150 H.P. HISPANO ENGINE

# LINCOLN-STANDARD H. S. Biplane

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Can furnish either two or three seater. Orders received now and delivered promptly:

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A Word to the Wise Dropped from the Skies The aeroplane is in itself a novelty. Circular spinning and diving from a machine, when witnessed by an observer, represents a peculiar value, the cause of which it is difficult to describe. Advertising distributed from our aeroplanes is surrounded by an atmosphere of romance sufficient to cause people who ordinarily would not even glance at advertising literature to scramble eagerly in their efforts to secure as many copies as possible. These are taken to their homes and offices, where they are exhibited to visitors as costly souvenirs.

The experience gained while touring some of the Southern States as the Fifth Liberty Loan Circus, demonstrated that "bombs" and dodgers and other advertising material fluttering from the other into grounds is precised.

the sky into crowds is practical.

From your own experience, you realize that AERIAL ADVERTISING is a striking and efficacious method of presenting your product to the masses, and we have worked out several novelties unique in color and original in design, which will interest you. Compared with the results obtained, our rates are lower than you are now paying for newspaper and magazine space, and we can accomplish your aim efficiently and at less expense than you can do it by any

We have a large staff of aviators and practical men in our employ for the mechanical part of our work, and in addition we have the advertising men and means of making your aerial advertising of extraordinary value. One of our representatives will gladly call upon you and outline our plan, without obligation.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to special Aerial Routes in the United States furnished on application to prospective advertisers.)

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FEB 24 1920

# WEEKLY

Vol. 10, No. 19

**FEBRUARY 23, 1920** 



An Aerial View of the Famous Observatory On the Top of Mount Wilson

Applications For Sanction Made to A.C.A. for Three Aerial Contests With Over \$100,000 In Prizes





# Assure Maximum Safety

There is a *greater* sense of safety in using Champion Dependable Spark Plugs.

At extreme temperatures, under all conditions, Champions are found equal to every demand made upon them.

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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City WASHINGTON OFFICE: 413 Union Trust Bldg.

LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., February 23, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, FEBRUARY 23, 1920

NO 19

# APPLICATIONS FOR SANCTION MADE TO A.C.A. FOR THREE AERIAL CONTESTS WITH OVER \$100,000 IN PRIZES

PPLICATIONS for sanction were received during the past week by the Aero Club of America for three aerial contests to be held under the rules of the International Aeronautic Federation with a total of over \$125,000 in prizes as follows:

(1) From the Aero Club of Southern California and the Aerial League of the Pacific Slope for an aerial rally and aviation meet to be held at Los Angeles in April. It is expected that the prizes will amount to \$50,000. Large prizes will be offered for the best flights made from anywhere to Los Angeles and the balance for the best records made during the meet to be held at Los Angeles. It is open to pilots holding the international pilot certificate issued by the Aero Club of America in the U. S. Applications for entry should be made to Mr. K. M. Turner, President Aero Club of Southern California, Hellman Building, Los Angeles, California.

(2) From the Aero Club of the Northwest, for the Alaska Aerial Derby, from Seattle, Washington, to Juneau, Alaska, a distance of approximately 870 miles, and return to Seattle by way of Skagway, Sitka, Petersburg, Wrangell and Ketch-

This First Alaska Aerial Derby is to start on May 22 and is to be for seaplanes as the route is over water. Prizes are expected to amount to \$35,000.

This event is open to pilots holding the international pilot certificate issued in the U. S. by the Aero Club of America. Applications for entry and for further details should be addressed to Mr. Teel Williams, President Aero Club of the Northwest, Seattle, Washington.

From the Aero Club of Illinois for an aviation meet to be held in Chicago during July or August, the prizes for which are expected to amount to \$50,000. This event is to be open to pilots holding the international pilot certificate issued in the U. S. by the Aero Club of America. Applica-

tions for entry and for further information should be addressed to Mr. James S. Stephens, Vice-President Aero Club of Illinois, Chicago, Illinois.

During the month of June pilots will have opportunities to win prizes in the contests to be held at Atlantic City in connection with the Third Pan-American Aeronautic Congress and First Aerial Touring Congress, to be held at Atlantic City from June 1 to June 10.

Besides the above there are a dozen other important in-

Besides the above there are a dozen other important international and national aerial contests scheduled to be held during the year as the Aero Club of America has issued over 7,000 pilot certificates, and over 1,000 people already own or have ordered aeroplanes. It is believed that there will be enough competitors to make a great success of each of these events from the standpoint of number of competitors.

The Aero Club of America grants sanctions for contests Aeronautic Federation of which it has been the sole and official representative in the United States since 1905. Applications for sanctioner for pilot certificates should be addressed to Mr. Alan R. Hawley, Chairman Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.

Last year the Aero Club of America and the Aerial League of America offered over \$100,000 in prizes for aeroplanes, dirigibles and kite and free balloon contests, and organizadirigibles and little and free bandon contests, and organiza-tions were anxious to enter but could not obtain aircraft, due to some extent to the fact that factories were unable to supply civilian demand in the spring and early summer during the liquidation of Government contracts, and the Army and Navy did not release surplus military aircraft until late in the season. The prizes were returned to the givers and the contests called off. There is no danger of this happening this year.

#### \$100,000 AERIAL "DARK HORSE" WILL STRENGTHEN AMERICA'S CHANCE OF WINNING INTERNATIONAL AVIATION TROPHY

THAT an aerial "dark horse" in the shape of an aero-plane capable of a speed of 200 miles per hour and costing \$100,000 is being constructed to strengthen America's chances of winning the Gordon Bennett International Aviation Trophy this year was announced by the Aero

Club of America to-day.

This aerial "dark horse" is the entry of the Aero Club of Texas, which was the first of the forty clubs affiliated with the Aero Club of America to respond to the latter's invita-tion to participate in the international aerial contests to be held this year. The Aero Club of Illinois may also make an entry.

On learning that it is likely that unless we win the trophy this year, it will be lost to us forever, Mr. S. E. J. Cox,

the president of the General Oil Company, of Houston, Texas, a member of the Board of Directors of the Aero Club of Texas, promptly offered to spend \$100,000 if necessary to "bring the Gordon Bennett to Texas." The entry was made by Mr. C. Anderson Wright, the president of the Aero Club of Texas, who arrived in New York with Mr. Cox a few days ago to consult with the Aero Club of America officials regarding the race. At a conference with Messrs. Alan R. Hawley and Henry Woodhouse of the Contest Committee of the Club, Mr. Cox stated: Mr. Cox stated:
"We want to show that American aeronautic engineers can

produce aircraft supreme to other countries. The best test of superiority in aircraft is speed and air worthiness, with the

(Continued on page 703)

### CHANGES OF REGULATIONS FOR AIR RECORDS AND CONTESTS

HANGES of the international regulations regarding aerial record making and for contests for which \$2,000,000 in prizes are scheduled are announced by the Aero Club of America. These changes have been adopted Aero Club of America. These changes have been adopted by the eighteen countries represented in the International Aeronautic Federation, of which the Aero Club of America is the sole representative in the United States, and went into effect immediately. The changes modify the rules for tests for obtaining pilot certificates, as well as for making records of duration, distance, speed and altitude.

"Aviette" Records to Be Recognized

A new class of records of motorless aeroplanes or "aviettes"

A new class of records of motorless aeroplanes or "aviettes" has been created, but the Federation refused to create feminine records as a separate class, the refusal being based on the fact that women have been found to be as good aviators as men, therefore it is not necessary to create a separate class of records.

Flying Club Application Rejected
The Federation has rejected the application for affiliation of the American Flying Club and has notified the Flying Club that all communications to the Federation from the United States must be sent to the Aero Club of America, which has been the official representative of the Federation in the United

States for fifteen years and is the only American organiza-tion recognized by the Federation.

The Federation has also denied the Flying Club the author-ity to officiate at tests for records and has notified the national aero clubs of the eighteen countries affiliated with the Federation that the Flying Club is not and never has been recognized by the Federation and has not, and never had, authority to organize contests or officiate at the making of or homologate records. Pilots are forbidden from participating in any contest or event organized by the Flying Club. Any pilot who fails to obey these instructions will not be permitted to participate in contests held anywhere in the world under the rules of the Federation, and his records will not be recognized. will not be recognized.

Gordon Bennett Aviation Trophy and International Maritime Trophy Rules

The regulations for this year's contest for the Gordon Bennett Aviation Trophy provide for a race over a cross-country course of 300 kilometres, in a circuit of 100 kilo-

The race will take place in France at the end of September.

The race for the Jacques Schneider International Maritime Trophy will take place at Venice, Italy, towards the end of August or early in September.

The proposal of the Royal Aero Club that machines should carry a useful load as ballast of 300 kilogs, was agreed to. The further proposal of the Royal Aero Club that the alightings on the water should form a qualifying test prior to the proper was also agreed to.

Rules for Aerial Derby Around the World and Atlantic Aerial Circuit to Be Submitted to National Aero Clubs of

Eighteen Countries.

The Aero Club of America submitted rules for the proposed Aerial Derby Around the World and the Aerial Circuit of the Atlantic. It was decided to defer consideration until the regulations, drawn up by the Aero Club of America, had been circulated to the national aero clubs of eighteen countries forming the Federation.

New Regulations for Records

The following are the aeroplane records recognized by the Federation Aeronautique Internationale:—
1. Duration. (Returning to point of departure without

alighting.)

2. (Distance. (Returning to point of departure without

alighting.)

The distance will be determined by the measurement of the arc of a great circle, taken at sea-level, which joins the vertical of the point of departure to that of the point of arrival.

3. Height. (Returning to point of departure without alighting.)

4. Speed records:-

(a) Speed over a given distance. Greatest speed, returning to point of departure, over:—

500 kilometres. 100 kilometres. 200 kilometres. 1,000 kilometres.

200 kilometres.

and then for every additional 500 kilometres.

(b) Greatest speed. Speed measured over a straight line course of 1 km., to be covered twice, once in each direction, in a single flight at a maximum height of about 50 metres. This must be the height of the machine 500 metres before entering the course. The greatest speed shall be determined by the average of the speeds without any correction.

The record for greatest speed must be beaten by at least 4 km., an hour.

The times must be taken in accordance with the instructions on the plan of the course. (See Figure.)

Speed Records-Plan of Course Distance over which the flight must be horizontal:

+ + + + + Distance timed from Post No. 1.

- - - Distance timed from Post No. 2.

Course followed by aircraft.

The time + + + + less the time - - - the average time of the double flight.

5. Records for useful load transported:

The records: 1, duration; 2, distance; and 3, height, may be established for useful load, in addition to the pilot:—

250 kgs. of useful load.

500 " " " " 1,500 kgs. of useful load.

2,000 " " " " "

22 1,000 " 22

and then for every additional 1,000 kgs.

Control of Height Records

The height attained shall be determined by barometric pressure, converted into height from a standard table based on the following formula:-

$$z=5 (3064+1.73 P-0.0011 P^2) \log \frac{760}{P}$$

This table must be used in all countries represented on the Federation Aeronautique Internationale.

The pressure readings shall be interpreted by a calibration of the instrument under an air pump at an official laboratory, under the responsibility of the Aero Club of America. A certificate of such calibration shall be attached to the papers of claim. The point of departure of the flight shall be 760 mm. pressure. The height attained shall be determined by means of the standard table, whatever the height of the point of departure and the pressure at this point at the time of the performance.

point of departure and the pressure at this point at the time of the performance.

Note.—The height attained in the first attempts to beat the present records must be calculated as follows:—

1. In accordance with the method employed previously to establish the increment of 150 metres.

2. In accordance with the present regulations, which will give the figure to be assigned to the competitor.

Height records must be beaten by at least 100 metres.

World Records Resumed

World Records Resumed

The Italian representative reported that, although the freedom of the air had not been granted in Italy, they had accepted the invitation of the Federation to concur in the resumption of granting world's records. It was therefore decided to grant world's records as from January 6, 1920. Since then the decree forbidding civilian flying has been revoked.

New Rules for Aviators' Certificates

On the proposal of the Royal Aero Club, the tests for Pilots' Flying Certificates were amended as follows:—

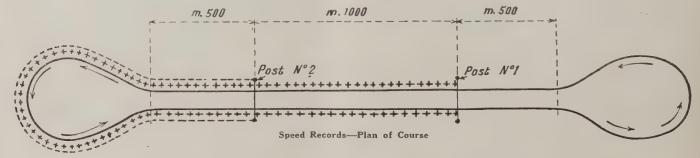
Test A—A flight without landing, during which the pilot shall remain for at least an hour at a minimum altitude of 8,000 metres above the point of departure. The descent shall firmsh with a glide, the engines cut off at 1,500 metres above the landing-ground. The landing shall be made within 150 metres or less of a point fixed beforehand by tofficial examiners of the test without starting the engine again.

Test B—A flight without landing around two posts (or buoys) situated 500 metres apart, making a series of five figure-of-eight turns, each turn reaching one of the two posts (or buoys). This flight shall be made at an altitude of not more than 200 metres above the ground (or water) without touching the ground (or water). The landing shall be effected by:—

(i.) Finally shutting off the engine or engines at latest when the aircraft touches the ground (or water).

(ii.) Finally shutting off the engine or engines at latest when the aircraft touches the ground (or water).

The Aero Club of America, as the representative of the Federation Aeronautique Internationale in the United States, is prepared to observe attempts for records in the above categories. Applications should be addressed to Alan R. Hawley, Chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City, N. Y.





# THE NEWS OF THE WEEK



#### Navy to Build Giant Airship

WASHINGTON .- The largest dirigi-WASHINGTON.—The largest dirigible in the world will be built by the United States Navy if Congress grants an appropriation of \$2,500,000 asked of the House Naval Committee by Capt. Thomas T. Craven, Director of Naval Aviation

The proposed dreadnought of the air will be 694 feet long, 50 feet longer than the airship being built for the United States Navy in Great Britain.

In urging the appropriation, Capt. Craven discussed the future of aerial war-

fare as a complement of fleet operations. The ship will carry more armament than

any similar craft now in contemplation by any country. It will use helium, the non-inflammable gas.

The big ship now being built will be completed late this summer. Crews are being trained now to fly this ship across the Atlantic next fall. The larger ship will be built in this country after the other ship has arrived from England.

The Department hopes to continue nine Hawaii. These will be at Chatham, Mass.; Rockaway Beach, L. I.; Cape May, N. J.; Anacosta, D. C.; Charleston, S. C.; Pensacola, Fla.; San Diego, Cal.; Panama and

#### Seattle Wants Municipal Aerodrome

A number of citizens of Seattle, Washington, are making a determined stand for a municipal landing field. They are urging for what, they can clearly see, will be to the future aeronautical advantage of their city and community.

#### Stehlin in Poland

A recent communication received from Capt. Joe C. Stehlin, who is rendering service against the Bolsheviki in Poland, indicates that he is well. "It feels fine to get down to real work again," he writes. "Little if any actual combat with Bolshevists; they are all practically German airmen."

#### Aeroplane to Replace Torpedo Destroyers

CLEVELAND.—A Martin aeroplane, designed to supplant the torpedo boat destroyers, received an official trial here recently and exceeded all requirements of the Navy Department.

The aeroplane carries a torpedo weighing approximately a ton and can be

launched from aboard ship.

The machine had a speed of 114 miles an hour and climbed 4,000 feet in six minutes. Specifications call for 105 miles an hour and an ascension of 4,000 feet in ten minutes.

#### Air Travel De Luxe

. The airship "R33" has been making a tour of the French battlefields. It carried a chef and gave its passengers French cooking, and real beds, with sheets. During a flight from Amsterdam to England, this lunch was served on a passenger aeroplane: Salmon mayonnaise, cold chicken, fruit salad and wine.

#### Canadian Aero Club Officers Elected

Toronto.-The Aero Club of Canada held its annual meeting in the club's quarters at 34 Yonge Street and transacted

considerable business in connection with the program for the year to promote aviation. An election of officers was held and the following members were placed in office: Col. W. J. Barker, V. C., honorary president; Col. A. K. Tylie, president; Major B. S. Wemp, D. F. C., first vice-president; Major A. M. Shook, vice-president for Ontario; A. F. Penton, honorary secretary; Capt. E. A. McKay, honorary treasurer. The following directors were elected: Capt. A. J. Hember, Capt. J. W. C. Clark, Major M. M. Sisley, Lieut. J. K. Shook and Lieutenant Purvis. considerable business in connection with

#### Flying Boats Shipped to San Diego

The U. S. S. Orion arrived at San Diego Tuesday with eleven F5L type flying boats for the Pacific Fleet Air Detachment at North Island The seaplanes will be used to maintain the regular daily air mail service between the island and San Pedro in Los Angeles harbor. Additional ships are understood to be en route by rail, arrival of which will greatly increase accretion. rival of which will greatly increase activity at the naval air station.

#### Aerial Film Very Successful

The motion picture "The Great Air Robbery," which was put on the screen by the Universal Film Manufacturing Co., featuring Ormes Locklear and Curtiss J-N's in a story of the aerial mail, has achieved remarkable success.

#### Planes to Spot Seals

Washington.—Aeroplanes will be used on the coast of Newfoundland and eastern Canada for the purpose of locating seal herds, according to a report received by the Bureau of Foreign and Domestic Commerce. The undertaking is thought to be feasible and it is predicted will prove profitable.

#### Major Pollock in Paris

Granville A. Pollock of New York city, formerly a member of the Lafayette squadron, has arrived in Paris on an in-

vestigating mission for the New York aerial police. He intends to study the laws governing international air communications and see whether there is anything in them which can be applied profitably in America. He intends to fly

to Spain and Portugal.
"While European cities have not yet established aerial police forces such as we have in New York city," he said, "they have developed commercial transportation in an admirable way. Air lanes have been established between Paris and London, Paris and Brussels and Madrid and Lisbon, and the authorities have regulated many things, such as aerial customs du-ties, frontier crossings and landing restrictions, which we can study with profit.

"Our volunteer air force in New is a novelty as yet, but it is bound to expand. Already we perform useful services in relieving port congestion and preventing lawless exploitation of the air. The city of New York can afford to send some of us abroad to investigate European conditions, for we are a volunteer organization and draw no salaries. Aeroplane traffic is going to increase in the immediate future, and it is for that we are preparing."

#### Aerial Taxis for London Strike

LONDON.-While taxicab drivers indulge in a twenty-four-hour strike to enforce their demand for an increase in their schedule of fares an enterprising aircraft company has launched a scheme

aircraft company has launched a scheme for aerial taxis.

For a fare of fifty cents a mile two passengers will be carried at a speed of one hundred miles an hour, piloted by a skillful aviator, in an aeroplane which provides a place for carrying light luggage. It now is possibble to travel in this way from London to the south of France for \$225 for \$225.

By the use of the aerial taxi, an American business man claims to have closed a \$15,000 deal which he otherwise would

have failed to get.



Winter sports at Toronto. Ice boats and one of the Canadian training planes of the Ericson Aeroplane Company, equipped with special landing skids

Aero Club at LaCrosse, Wis.

An aero club has been established at LaCrosse, Wisconsin, and the members have located the site for an excellent landing field, which is expected to be

ready with hangars this spring.

The field has been judged by Mr. Alfred W. Lawson, creator of the Lawson Air Liner, as a very satisfactory one, and Mr. Lawson will use it as one of the main landing fields on the coast-to-coast route over which his aeroplanes will fly.

Personal Paragraphs

John J. Eyre has become designing engineer with the Simplex Wire and Cable Company, Cambridge, Mass. He was until recently connected with the Sturtevant Aeroplane Company, Boston, Mass., in the capacity of factory engineer.

Prof. George W. Lewis, formerly general manager Clarke Thomson Research, Philadelphia, has been appointed executive officer National Advisory Committee for Aeronautics.

Arthur E. Allen, who was manager of the supply division Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa., before the war, in which he was with the Canadian war, in which he was with the Canadian overseas force, and later second lieutenant with the Royal Flying Corps, has been appointed district manager at New York for the Westinghouse company. He succeeds E. D. Milburn, promoted to vicepresident of one of the allied companies.

To Dispose of Hangars

The Material Disposal and Salvage Division of the Supply Group have a number of hangars and frames for sale. The items are as follows: Approx. Price items are as follows: A 171 Alban Richards type A

Alban Richards type A
aeroplane hangars.....\$6,000 \$2,000
Size 72 ft. x 41 ft.,
front 72 ft.
High (front) 15 ft.
High (ridge) 23 ft. 9 in.
High (rear) 8 ft. 6 in.
Depth 40 ft.
Includes frame and can

Includes frame and can-

Virginia.

vas cover. 244 Frames only.......\$5,400 1,300 The above hangars and frames are located at Kearney, N. J., and Morrison,

If any further information is desired a

letter should be addressed to the Material Disposal and Salvage Division of the Supply Group, Washington, D. C.

Pacific Airport at San Francisco

San Francisco has saved a great aviation field for itself, when the Exposition Marina was leased to make it available as the great central airport of the Pacific Coast. The transcontinental Aerial Mail it is expected, will be extended to San Francisco this spring, or early in the summer.

The land is leased to the city for a year, subject to renewal on a new basis next year. The building of the hangars and the general conversion of the grounds into a good landing field will be the obligation of

the government.

Recently a meeting was called in San Francisco of all those interested in flying; the purpose being to point out the necessity of doing something to keep the city in line with aerial progress. Mayor Rolph has appointed excellent aviation authorities members of the San Francisco Airport committee. Plans have been made making San Francisco the airport of the Pacific, and work has started on clearing the ground in preparation for receiving the Lawson Airliner. The airport will upon completion receive aeroplanes, hydroaeroplanes or seaplanes and also dirigible airships.

Following are the members of Mayor

Rolph's airport committee:

Supervisor John C. Kortick, chairman; Colonel H. H. Arnold, commanding West-Colonel H. H. Arnold, commanding Western Department Army Air Service; George C. Boardman, vice-president of the Chamber of Commerce; Sidney S. Bibbero, Pacific Aero Club, 915 Monadnock building; William F. Benedict, Mayor's secretary; Perry L. Cumberson, Rotary Club; Frank E. Carroll, 57 Post street; R. A. Crothers, The Bulletin; Supervisor Cornelius Deasy; Frank De Lisle, 240 Montgomery street; George W. Gerhard, Civic League of Improvement Clubs; Supervisor Andrew J. Gallagher; R. B. Hale, representing Pacific Exposition; Supervisor Oscar Hocks; William L. Hughson, 1101 Van Ness avenue; Rear Admiral J. L. Jayne, commanding Twelfth Naval District; Supervisor Ralph Mc-Naval District; Supervisor Ralph Mc-Leran; Eugene McLean; Louis Mooser, First National Bank; Joseph Mulvihill,

president Board of Supervisors; Miss president Board of Supervisors; Miss Margaret McGovern; Frank C. MacDonald, San Francisco Building Trades Council; John F. Neylan; Charles A. Nelson, City Hall; John A. O'Connell, San Francisco Trades Council; William T. Porter, San Francisco Ad Club; Major Loring Pickering, representing San Francisco flying men; Supervisor Richard J. Welch; Supervisor Edward I. Wolfe, and John P. Young, the Chronicle.

#### To Promote Power Boat Racing and Aviation in Canada

Representatives of 150 yachting clubs of the Middle West and Canada have completed organization of the International Power Boat Union, the purpose of which, it was announced, would be to "promote the sport of power boat racing, to unify racing rules and authorize dates for the territory it embraces.'

Any group of three or more yacht clubs will be admitted to the union and each such organization will be represented on

the board of governors.

The principal organizations in the union are the Mississippi Valley Power Boat Association, Michigan Yachting Association and the Detroit River Yachting Association. Canadian and Lake Ontario groups are soon to be formed.

Officers include: President, Charles P. Hanley, Muscatine, Iowa; Vice-President, F. G. Ericson, Toronto; Secretary, Robert E. Power, Cleveland; Treasurer, Sheldon Clark, Chicago.

Clark, Chicago.

#### Complete Practical Machinist

This new book published by Henry Carey Baird & Co., Inc., containing 547 pages and 432 illustrations, is a volume which should be in the hands of every machinist. Joshua Rose, M. E., the author, has written a number of books on similar subjects and is competent to deal with the situation thoroughly. The book includes a discussion of lathe work, vise and bench work, drills and drilling, taps and dies, hardening and tempering, making and use of tools, tool grinding, marking out work, lathe attachments and their uses, machine tools, etc. The book is procurable through The Aeronautic Library, 299 Madison Avenue, New York, for \$3.30 postpaid.



The Pony Blimp manufactured by the Goodyear Tire & Rubber Co. and named by Major Charles J. Glidden, vice-president Aerial League of America, which will be seen for the first time in the East at the New York Aero Show, March 6-13



#### Major Inwood Now Manager of Interallied Aircraft Corporation

Major John Inwood, late of the Royal Air Force, has been elected Secretary-Treasurer of the Interallied Aircraft Corporation, and has also been appointed manager of the company, succeeding C. H. Payne, formerly Managing Director, and J. W. M. Richardson, formerly treasurer, resigned.

Major Inwood served with the Royal Air Force in England, France and Canada since 1916, and was in charge of the organization and operating and equipment branch in Toronto from its inception until last July when the affairs of the Force were wound up.

Major Inwood has not only had broad experience in flying, but also in the business of aeronautics, for his duties in the operating and equipment departments called for the organization of stores, the supervision of repairs and the purchase of supplies involving the expenditure of \$40,-000,000 during the 19 months he was in charge. He is also widely experienced in banking. Major Inwood is not a stranger

to the United States for he lived for a considerable time in California.

Lieut. Col. W. A. Bishop, V. C., etc., who continues as president of the Interallied Aircraft Corporation, will devote a great deal more of his time than hereto. great deal more of his time than hereto-fore to its affairs, which may also be said of Lieut. Col. W. G. Barker, V. C., etc., vice-president. The corporation will engage in the aircraft industry on a larger scale than formerly, and is selling in the United States the famous Avro machine.

#### Green Bay Company Organized

The Green Bay Aero Club, of Green Bay, Wisconsin, has been organized as a distributing, exhibition, and passenger service company. The company has a landing field of about 200 acres, and a full service station is maintained. A particuservice station is maintained. A particularly cordial invitation is extended to visiting fliers to use the field.

The officers of the company are as follows:

President, Clarence A. Gross; Vice-President, Andrew B. Turnbull; Secre-tary, Carl E. Dreutzer; Treasurer, Perrv S. Wagner; Manager, Eugene K. Wagner; Publicity Manager, Donald M. Murphy; Pilot, F. F. Manor.

#### New Texas Company

The Panhandle Aerial Service and Transportation Company has been chartered in the state of Texas, with its principal office at Amarillo, Texas. The company has an aerodrome of over 300 acres adjoining the city of Amarillo and hangar space for visiting planes. The company was organized for the purpose of developing commercial aviation and they now

Mr. W. K. Whipple, General Manager of the company, states that it is their intention to establish two long cross country routes, using large passenger carrying

Amarillo, Texas, is a very convenient point for cross country fliers to rest and they are sure of a cordial welcome and can obtain expert service. A large stock of repair parts are carried for Curtiss motors and ships.

#### At the New York Show

The man who intends to spend a few thousand dollars for the newest vehicle in the world's commerce-aircraft-will undoubtedly find just what he wants at the annual aeronautical exposition which the Manufacturers Aircraft Association will hold at the Seventy-first Regiment Armory in New York, March 6 to 13th.

Among the twenty or more aeroplanes and lighter-than-air craft to be exhibited, are several surprises—recently developed planes new to both flying man and lay-man. They will be lower in cost, far more comfortable and easier to operate this rear than were the war machines ex-

hibited at last year's show.

The exhibits range throughout the industry. The L. W. F. Engineering Corporation has entered its two vastly different machines. The L. W. F. Cato "Butterfly" is a monoplane weighing less than 500 pounds and designed to sell within the \$2500 mark. The huge L. W. F. freighter will carry from 3000 to 6000 pounds cargo. It is designed for the transcontinental mail route. The freighter has a wing span of 106 feet from tip to tip, while the "Butterfly" is diminutive in size and appearance.

The Curtiss Aeroplane & Motor Corporation will show a new Eagle—the multimotored aerial pullman, capable of carrying from eight to ten passengers; also Orioles—the swift overland machines equipped with new style cockpits and possessing more room for passengers than the first type Orioles.

Aeromarine flying boats fitted with leather upholstered tonneaus where the passengers sit in comfort in the rear of the pilot with cigar lighters and vanity cases at their disposal will be shown by the Aeromarine Plane & Motor Corpora-

The Thomas-Morse transcontinental air mail plane is being given its initial flights at Ithaca, N. Y., preparatory to being entered in the show. It is unique in design and construction. Its two 300 horse power Hispano-Suiza engines will carry it with pilot and mechanic and 1,500 pounds of mail for 500 or 600 miles without stopping and at a speed of 135 miles an hour.

The plane has wing span of only 45½ feet and its two bodies are each 35 feet The motors are both in the nacelle, one in the nose, the other in the rear.

The Glenn L. Martin Company will show one of its big aerial transports of

the type that has had marked success on the New York to Chicago mail route. The Dayton Wright Airplane Company have entered the O. W. aerial coupe and the K. T. cabin cruiser. The coupe is equipped with an eight cylinder Hispano-Suiza motor and is designed to be to the air what the luxuriously finished limousine is to the boulevard—a comfortable, serviceable adornment. It has great supporting surfaces and seats three passengers in comfortable upholstered chairs. The K. T. is equipped with a Liberty twelve.

Lighter than air craft will be represented by the Goodyear Tire and Rubber Company, Pony Blimp, a two man capacity, non-rigid dirigible with a cruising radius of 400 miles and a speed of forty

miles an hour.

Accessory manufacturers will show a complete assortment of the products they have originated and perfected during the year looking toward the refinement and the improvement, from a commercial standpoint, of all aircraft.



Major John Inwood, general manager; W. A. Bishop, president; and W. G. Barker, vice-president, of the Interallied Aircraft Corporation

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
Leon B. Lent, Assistant to the Second Assistant Postmaster General
in Charge of Aeronautics
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying
John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and Operation



PILOTS

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellis
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I. Stanton, Superintendent New York-Washington Division George O. Noville, Superintendent New York-Cleveland Division Edward McGrath, Superintendent Cleveland-Chicago Division William J. McCandless, Superintendent Chicago-Omaha Division Harry L. Hartung, Manager, Heller Field, Newark Herbert Blakeslee, Manager, Bustleton Eugene W. Majors, Manager, College Park Andrew R. Dunphy, Manager, Chicago Maurice J. Kelly, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

**PILOTS** 

Samuel C. Eaton Frederick A. Robinson Elmer G. Leonhardt Walter J. Smith Farr Nutter Wesley L. Smith Joseph P. Harris Clayton W. Stoner Mark C. Hogue

#### \$3,400,000 for Aeroplane Mails Urged Second Assistant Postmaster General and Minneapolis. He also asked other in Senate

Washington.—Retention of the aeroplane mail service, for which the House refused to provide funds, was urged before the Senate Postoffice Committee by

Praeger. He asked that \$3,400,000 be provided for service on routes from New York, Chicago, San Francisco, Pittsburgh, Kansas City, Detroit, Washington, Cleveland, Toledo, St. Louis, Atlanta, St. Paul

funds for private aeroplane mail contracts on branch routes.

Stating that the aerial service expedites mail to Chicago by sixteen hours and to San Francisco by twenty-four hours, (Continued on page 706)

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-CHICAGO ROUTE

Monthly Report of Operation and Maintenance DECEMBER, 1919

		1	e	1	uel.		.	·						SER	RVIC	E ANI	UNIT	COST	
Aeroplane No.	Gasoline	Grease and Oil	Office Force and Watchmen	Motorcycles, Trucks	Rent, Light, Fuel. Power, Telephone and Water	Miscellaneous	Pilots.	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time	Kun	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
34 39A 46	\$117.48 10.50 75.60	\$11.11 .49 29.70	\$86.09 86.09 86.09	\$26.90 26.90 26.90	\$21.33 21.33 21.33	\$60.97 60.97 60.97	\$105.47 104.57	\$132.28 25.99 87.61	\$78.40 15.35	\$72.50 37.50 41.43	\$65.08 65.08 65.09	\$777.61 334.85 614.64	421 35 270	hr. n	44	910	2.2	\$79.86 63.60	\$0.85
60 65 66 71	49.45 75.46 28.00	7.65 15.85	86.09 86.09 86.09 86.09	26.90 26.90 26.90 26.90	21.33	60.97 60.97 60.97 60.97	115.04 37.20	23.46 55.71 100.67 80.00	222.50 31.00 41.90	50.00 50.00 50.00 50.00	65.09 65.09 65.09 65.09	333.84 760.73 570.56 461.03	175 259 100		37 26	980 475	5.6 1.8	71.58 166.14	.78 1.20
72 75 76 79 81 85	20.16 212.96 358.17 311.60	3.60 42.95 53.55 39.34	86.09 86.09 86.09 86.09 86.09 86.09	26.90 26.90 26.90 26.90 26.90 26.90	21.33 21.33 21.33 21.33 21.33 21.33	60.97 60.97 60.97 60.97 60.97 60.97	24.38 305.21 439.94 343.68	250.85 93.53 186.66 190.67 22.73 14.88	234.61 23.21 159.05 52.77	50.00 50.00 50.00 50.00 50.00 50.00	65.09 65.09 65.09 65.09 65.09 65.09	843.98 988.24 1,507.75 1,248.44 333.11 325.26	72 721 1,244 1,085	2 28 40 31	15 10 36 43	200 2,581 3,660 3,007	2.8 3.5 2.9 2.8	375.06 35.04 37.14 39.36	4.22 .38 .41 .42
88 91 92 94 95 98	68.75 301.42 60.10	8.60 33.12 6.82	86.09 86.09 86.09 86.09 86.09 86.09	26.90 26.90 26.90 26.90 26.90 26.90	21.33 21.33 21.33 21.33 21.33	60.97 60.97 60.97 60.97 60.97 60.97	113.78 350.91 45.15	15.88 50.08 188.09 232.23 15.08 13 <b>0.30</b>	302.00 1,250.75*	50.00 50.00 50.00 40.00 50.00 50.00	65.09 65.09 65.09 65.09 65.09 65.09	326.26 551.59 1,485.92 1,895.43 325.46 440.68	242 1,059 205	10 32 4	30 23 10	999 3,100 411	4.1 2.9 2.0	52.56 45.90 45.48	.55 .48 4.61
99 101 102 103	47.60 173.73	8.11 18.07	86.09 86.09 86.09 86.10	26.90 26.90 26.90 26.90	21.33 21.33 21.33 21.33	60.97 60.97 60.97 60.97	77.28 150.62	63.01 103.63 120.73 46.18	22.30 68.50	50.00 50.00 50.00 50.00	65.09 65.09 65.09 65.09	373.39 569.30 842.03 356.57	170 617	7 13	08 54	445 1,288	2.6 2.1	79.80 60.54	1.27
104 105 106 107 108 201	310.70 146.48 215.30 308.33 181.83 53.48	50.26 13.05 30.52 32.47 17.03 5.00	86.10 86.10 86.10 86.10 86.10	26.90 26.90 26.90 26.90 26.90 26.90	21 .33 21 .33	60.97 60.97 60.97 60.97 60.97 60.97	271.80 117.75 336.82 333.21 185.84 37.93	196.02 109.87 210.52 176.88 190.11 4.00	33.41 22.00 68.45 92.09 38.30 8.25	50.00 50.00 50.00 50.00 50.00 200.00	65.09 65.09 65.09 65.09 65.09 65.09	1,172.58 719.54 1,172.00 1,253.37 923.50 569.06	1,092 522 742 1,098 613 191	25 10 31 30 17 3	05 52 05 45 09 30	2,451 1,021 2,961 2,856 1,712 535	2.2 2.0 4.0 2.6 2.8 2.8	46.74 66.18 37.68 40.74 53.82 162.60	.48 .70 .40 .44 .54 1.06
203 204 24227 44305	9.80 32.20 2.80 12.07	1.75	86.10 86.10 86.10 86.10	26.91 26.91 26.91 26.91	21.34 21.34 21.34 21.34	60.97 60.97 60.98 60.98	19.12 15.13	9.00 39.78 48.00 9.00	5.40 14.80 15.60	200.00 200.00 50.00 35.00	65.09 65.09 65.09 65.09	484.61 553.26 376.02 347.22	35 115 10 43	i i	47	210 35	1.8	310.20	2.63
Total	\$3,183.97	\$429.79	\$2,841.08	\$887.74	\$703.94	\$2,012.03†	\$3,530.83	\$3,223.43	\$2,800.64	\$2,076.43	\$2,147.95	\$23,837.83	11,136	325	53	30,637	2.8	\$73.14	\$0.78

Cost per mile, overhead, \$.28; cost per mile, flying, \$.23; cost per mile, maintenance, \$.27.

Note. Planes Nos. 34 to 46, inclusive (except 39-A), Curtiss R4, equipped with Liberty-12 motors.

Plane No. 39-A, Curtiss HA, equipped with Liberty-12 motor.

Planes Nos. 60 to 108, inclusive, and 24227, De Haviland, equipped with Liberty-12 motors.

Planes Nos. 201 to 204, inclusive, Martins, equipped with two Liberty-12 motors.

Plane No. 44305, Curtiss JN4D, equipped with Curtiss OX-5 motor.

†Includes part of cost of moving station from Belmont, N. Y., to Newark, N. J

## EFFECT OF TEMPERATURE AND PRESSURE ON THE SPARKING1 VOLTAGE

By L. B. LOEB and F. B. SILSBEE

#### Résumé

HE investigation described in this report was conducted at the Bureau of Standards for the National Advisory Committee for Aeronautics.

The spark discharge used to fire an internal combustion engine must pass through the compressed and heated mixture which occupies the engine cylinder near the end of the compression stroke. The object of the experiments described in this report was to determine how the voltage necessary to produce such a spark discharge varies with the pressure and temperature of the gas. The results are of value in showing what voltage an ignition system is required to deliver in order to produce a spark and in enabling one to set up in the laboratory a convenient experimental gap electrically equivalent to

that in the engine cylinder.

Measurements were made on spark plugs screwed into a bomb containing compressed air, and inserted in an electric furnace so that both pressure and temperature could be varied as desired. The sparking voltages were measured on four plugs, having different electrodes, at pressures up to 100 pounds per square inch and temperatures up to 550° C. Both 60-cycle alternating current and current obtained from a magneto were

alternating current and current obtained from a magneto were used. The observed voltages are plotted against pressure in plots 2, 3, 4, and 7, and against density in plot 5.

The results show that the sparking voltage is a linear function of the destiny of the gas and depends upon pressure and temperature only as they affect the density, i. e., heating a gas at constant volume does not affect the sparking voltage. For a typical spark plug gap set at 0.5 mm. (0.020 inch) the sparking voltage was found to be 2,800 volts at atmospheric density and 9,400 volts at a density five times as great.

The data given in this report were obtained on air only. The results of measurements made elsewhere indicate that the sparking voltage in an explosive mixture of gasoline and ir is about 10 per cent less than in pure air, and that the change in voltage is proportional to the amount of gasoline

change in voltage is proportional to the amount of gasoline present.

#### Introduction

This report describes some experiments made to determine the change of spark potential with pressure and temperature, in order to determine the necessary minimum potential for

<sup>1</sup>This Report was confidentially circulated during the war as Bureau of Standards Aeronautic Power Plants Report No. 14.

causing sparks to pass in a gasoline engine whose compression ratio was known and in which the temperature of the gases before ignition could be estimated.

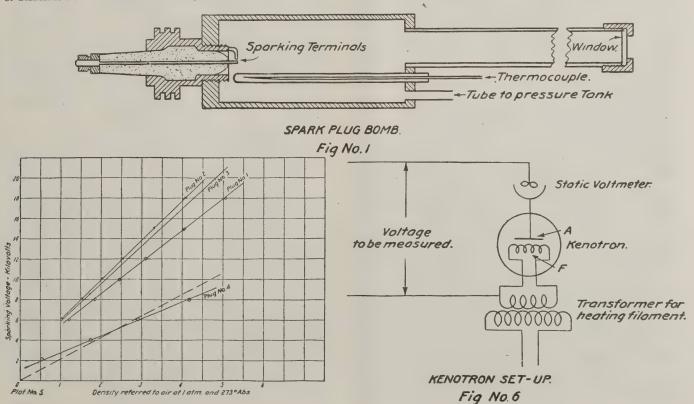
According to the simple theory (J. J. Thomson, Conduction of Electricity through Gases; Townsend, Electricity in Gases; and Peek, Transactions of the American Institute of Electrical Engineers, 1910-1916) the sparking potential depends solely on the density of the gas between the electrodes for a given fixed pair of electrodes, i. e., on the total number of molecules between the electrodes. This has been investigated over a considerable range of pressures, spark distances and forms of electrodes by numerous observers, but only three investigators have studied the effect of temperature, and then only over a limited range. They all found that the sparking potential depended solely on the density of the gas over the range studied.

In the study of aeroplane spark plugs it seemed advisable to determine whether this law held for pressures and temperatures which might occur in the cylinders of a high compression engine just before the ignition of the charge. In aeroplane engines the maximum compression pressures under normal conditions range from 90 to 130 pounds per square inch with temperatures up to 300° C.

#### **Apparatus**

The experiments were conducted as follows: An ordinary %-inch Titan A. C. porcelain plug was screwed into a steel bomb about 25 cm. (10 inches) long, having the design indicated in figure 1. There was a thick glass window opposite the sparking terminals when the plug was screwed in position. A high-pressure air tank connected to the bomb through sured the air pressure to any desired able valves served to regulate the air pressure to any desired value. Temperatures were measured by a Pt, Pt-Rh thermocouple, B. S. W5, which was inserted in a steel tube sealed at one end with walls ½ mm. (0.020 inch) thick. This was screwed in to the bomb so that its inner end was within 1 cm. of the sparking terminals of the plug. The bomb was placed in a cylindrical electric resistance furnace and packed with asbestos wool, so that only the porcelain insulator was exposed at one end, while the window projected out about 5cm. (2 inches) beyond the other end.

Sixty-cycle voltage was supplied through a step-up transformer having a ratio of 200:1 and applied between the central



electrode and the bomb. A resistance of 220,000 ohms was put in series with the plug to avoid an excessive current and consequent burning of the terminals when the spark passed. The voltage was read on a voltmeter connected to the low-tension side of an auxiliary step-down transformer. The passage of the spark was made evident both by the kick of the voltmeter and by the appearance of the spark in the bomb. Ionization was provided for by the use of a half milligram sample of radium in most of the experiments, while in some a 50-mgm. sample, placed just below the electric furnace, was also used. This ionization served to eliminate the complicating effect of spark "lag" and made the readings much more consistent and reliable. No striking difference in the readings could be noticed with the two different samples.

The tests were run on three Titan plugs: No. 1 had the regular terminals of Ni-Mn wire 1.3 mm. (0.051 inch) in diameter set at right angles and separated by 1.8 mm. (0.071 inch); No. 2 was a Titan plug with similar terminals 3.13 mm. (0.123 inch) in diameter rounded at the ends, separated by 1.2 mm. (0.047 inch); No. 3 was a plug like No. 1 but with a distance of 2.2 mm. (0.086 inch) between the wires. In each case the spark passed between the cylindrical surfaces of the wires near the point of closest proximity.

#### Procedure

The readings were taken as follows: The temperature was run up to the desired value and held constant from 15 minutes to half an hour. There were fluctuations at the higher temperatures of as much as 10 degrees either way so that a mean temperature was chosen as representing the true conditions. The breakdown voltage of the gap was then determined by at least 10 trials for each pressure. The pressure was increased in steps of 10 pounds per square inch. The pressures were read by two small pressure gauges whose ranges were from 0 to 100 pounds per square inch. The spark potentials were read to as high a pressure as it was possible to obtain without the sparks passing over the outside of the insulator. Then the pressure was reduced in steps of 20 pounds and read-

ings again made. As a whole the return readings checked the first readings well. This can be seen from the plots where maximum sparking voltage is plotted against the pressure for each temperature. As the voltage which could be used without sparking over the outside of the porcelain was about 19,000 volts, no voltages were measured above this. The pressure range over which the measurements could be carried out started from 60 pounds at room toemperature and increased until at 200° C., or thereabouts, pressures of 100 pounds could be used.

From then on the pressures were limited with increasing temperatures by a new phenomenon which may have been caused by electron emission from the hot terminals at high voltage. Under these conditions the spark was replaced by a sort of purple brush discharge (corona) which came on gradually as the voltage was increased.

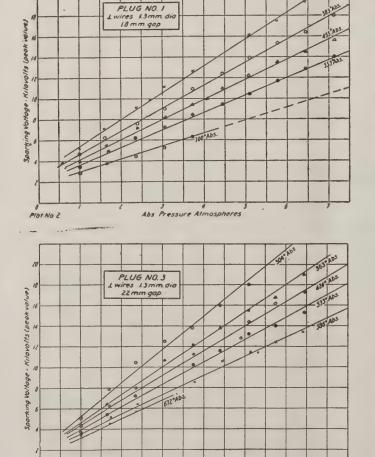
'It was at first thought that this glow discharge might be an important factor in causing ignition trouble. Further measurements were therefore made in the same apparatus but with a Bosch D-6 magneto as a source of voltage. With this arrangement no brush discharge could be detected although the observations were carried to 760° C. Above 600° C, the electrical conductivity of the porcelain insulator was great enough to prevent the magneto from sparking at the higher pressures, but there was no sign of brush discharge under any conditions. It is probable that a certain time is required for such a discharge to form and that the very sudden application of voltage produced by the magneto does not admit of this.

#### Results

PLUG NO.2 ods 3.13 mm.dia. 1.2 mm.gap.

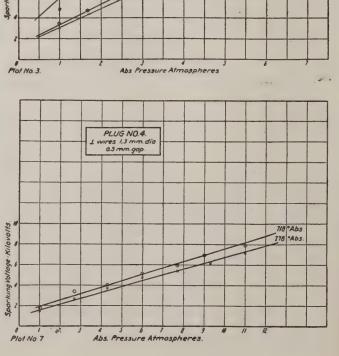
The curves plotted between maximum sparking potentials in kilovolts and pressure in atmospheres may be seen in plots 2, 3 and 4. The results represented by all these curves, except the one for low temperature measurement with the larger terminals could be repeated consistently. It is possible that a stronger source of ionization should have been provided, and the voltage increased still more slowly in this case. The slight curvatures of the lines may be due in part to the gauges,

637° Abs



Abs Pressure Atmospheres

Plot No. 4



since no calibration corrections were applied. The direction of the curvature is the same as that noted by other observers.

The data given in the curves were analyzed by first reading from each of the curves the pressure corresponding to a given voltage, say 10,000 volts. From this pressure and the temperature pertaining to the cure, the relative density of the gas is then computed by the formula:

$$\rho = \frac{\delta}{\delta_0} = 273 \frac{P}{T}$$

where  $\delta_0$  is the density at 1 atmosphere and 273° absolute, P is the pressure in atmospheres, and T the absolute temperature in degrees centigrade. This was done for six different voltages on each plug. Table I gives the results on plug No. 1 at 10,000 and 8,000 volts, and is typical of the other data. It is evident that the densities thus obtained are constant within a few per cent over the entire range and show no systematic change with temperature or pressures.

TABLE I.

	Density at				
Temperature Abs.	10,000 volts	8,000 volts			
00°	2.51	1.83			
83°	2.46	1.80			
55	2.27	1.80			
53	2.38	1.78			
00°	2.59	1.96			
Mean	2.45	1.83			

It may therefore be concluded that the breakdown voltage is a function of the gas density only. To determine the form of this function the average values of density obtained as described above are plotted against the corresponding voltage in plot 5. The curves thus obtained show that the breakdown voltage is a linear function of the density but is not proportional to it. The data can be represented by the following equations:

Plug No. 1  $E = 2.2 + 3.1 \rho$ Plug No. 2  $E = 1.8 + 4.0 \rho$  $E = 2.4 + 3.4 \rho$ Plug No. 3

Where E is the sparking voltage in kilovolts and  $\rho$  is the density relative to air at atmospheric pressure and 0° C. The constants in these equations are of course dependent upon the shape and spacing of the electrodes, and would be smaller for the case of the shorter 0.5 mm. (0.020 inch) gaps used in spark plugs.

In addition to the measurements with alternating current descirbed above, a second seres of tests was made, using a Bosch D-6 magneto as the source of e. m. f. and a special crest voltmeter equipment to measure the breakdown voltage.

This equipment consisted of an Albrecht electrostatic voltmeter connected in series with a G. E. kenotron (electric valve) as shown in figure 6. This valve permits current to flow when the heated filament F is negative with respect to the relatively cold anode A, but allows no current to flow in the reverse direction. Consequently, a negative charge accumulates on the insulated conductor, formed by the anode and the case of the electrometer, of such amount that when the sparking electrode and voltmeter needle are at their greatest positive potential the filament and anode are at the same potential, and there is no tendency for further charging. During the rest of the time the needle of the voltmeter is near ground potential, but the rectifying effect of the kenotron prevents the charge from leaking off. Consequently the meter comes to a steady deflection which measures the maximum positive voltage applied.

Runs were made with this apparatus at temperatures of 460° C. and 520° C. up to pressures of 150 pounds per square inch, using a Champion (Toledo) plug No. 4 with X-bend electrodes set with the usual spacing of 0.5 mm. (0.020 inch). The results as obtained are plotted in plot 7 and the combined data from these curves are plotted against relative density in plot 5, giving a line whose equation is

$$E = 1.1 + 1.7 \rho$$
.

These measurements with the magneto and crest voltmeter showed the presence of a further complication due to the fact that the heat of the spark raised the temperature of the electrodes very materially. This in turn heated the gas near them so that the discharge occurred through gas which was decidedly less dense than the surrounding atmosphere. This was indicated by the fact that at first starting the magneto the voltmeter showed a relatively high voltage (in one case 4,100 volts), which decreased gradually for nearly a minute, after which it remained constant at a much lower value (2,350 volts). The time required for the change implies very strongly that it is a purely thermal effect rather than any ionization due to the preceding sparks, since the latter effect would be almost instantaneous. In the case of a spark plug in an engine cylinder, the central electrode, being insulated thermally as well as electrically by the core, is much hotter than the incoming charge and consequently this effect may be present to some extent.

As a check upon the laboratory data measurements were also made in a Hall-Scott A-5 aviation engine having a compression ratio of 4.2:1. Owing to the late closing of the intake valve and the advance of the spark, the actual ratio of cylinder volume at intake to that at ignition was only 3.2:1. If it can be assumed that the charge in the cylinder is at atmospheric pressure and temperature at the closing of the intake valve, then the relative density at ignition will be 3.2. Plug No. 4 was run in this engine firing from a Dixie "98" magneto. The crest voltage as measured by the kenotron was found to be 5,950 volts. Measurements with a calibrated spark gap having 1 cm. spheres indicated 4,500 volts. The voltage predicted for this density from figure 5 is 6,400 volts.

In comparing these results it must be borne in mind that the crest voltmeter loses its charge very slowly, so that it really indicates the highest peak occurring during two or three minutes preceding the reading. The parallel spark gap, on the other hand, is adjusted to fire about half the time and probably gives more nearly the average crest voltage. It appears, therefore, that the results obtained in the laboratory are in substantial agreement with those found on the engine, and that the linear relation between voltage and density may be safely applied to ignition circuits.

It will be noted that the results shown in plot 5 can be represented roughly by a straight line through the origin, such as is shown dotted, and which indicates a direct proportionality between the sparking voltage and density. This portionality between the sparking voltage and density. portionality between the sparking voltage and density. This relation will be found useful in cases where the voltage is known at some one density and it is desired to estimate it for another density not too widely different. It is unsafe, however, to use this law of direct proportionality to extrapolate over a long range from the sparking voltage at normal atmospheric density to that at a very high density.

Conclusions

These experiments confirm the relation that the breakdown voltage of a spark gap depends only upon the density of voltage of a spark gap depends only upon the density of the gas and varies with pressure and temperature only as they affect the density. This relation is found to be valid up to 800° C. and 8 atmospheres pressure. Both the pressure and temperature of the charge in a gasoline engine increase very greatly during the compression stroke, but the sparking voltage can be computed from the linear relations shown in plot 5 without a knowledge of these variables separately, since the density is determined solely by the original density and the compression ratio. For small changes in density, as between engines of different compression ratios, the assumption that voltage is proportional to the density may be made.

With the sudden discharge from an ignition coil or magneto disruptive spark is produced even at temperatures where a

60-cycle voltage would produce a brush discharge.

The voltage required for a spark plug set at 0.5 mm. (0.020 inch) in an availation engine of moderate compression is of the order of magnitude of 6,000 volts.

<sup>&</sup>lt;sup>1</sup>Sharp, C. H., Electrical World, 69, p. 556, 1917.



### THE SOPWITH AUSTRALIA TRANSPORT BIPLANE

HE Sopwith Australian transport is not unlike the Sop-

with transatlantic in general outline.

Being designed for such a long journey, one of the first considerations, next to aerodynamical efficiency, has naturally been the provision of the maximum of comfort for the occupants. As will be seen from the accompanying illustrations, the machine has a very deep fuselage, forming an enclosed cabin for the pilot and engineer. Inside this cabin are ararnged the two seats, that of the pilot-navigator being in front. These seats are mounted on a tubular framework which can be raised and lowered, running on vertical tubular guides, and locked in any desired position. If, therefore, the pilot wishes to be absolutely protected from the weather he lowers his seat and draws the sliding panel in the roof he lowers his seat and draws the sliding panel in the root of the cabin over the circular cockpit, when he is as comfortable as possible, out of the draught and noise. Just before landing, or if, for any reason, during the voyage he wishes to obtain a better view than that afforded from inside the cabin, it is a matter of a few seconds only to slide the panel forward, raise the seat, and he is then in the same position, relatively to the *fuselage* and wings, as in an open machine. The rear cockpit is similarly arranged

machine. The rear cockpit is similarly arranged.

All the controls are in duplicate, the "stick" being a tube which slips into the socket on the control shaft. At a moment's notice, therefore, either of the occupants can take over the control of the machine, the other withdrawing his "stick" and placing it on the side of the fuselage, where suit "stick" and placing it on the side of the fuselage, where suitable clips are provided. An interesting feature of the pilot's controls is that the rudder bar is in duplicate, one bar being placed low near the floor the other higher up to correspond with the highest position of the seat. In this manner no matter at what height the seat is placed, one foot bar is in a comfortable position, and as a matter of fact even with the seat at its highest position the lower foot bar is within reach, thus allowing the pilot to stretch his legs without taking his feet off the rudder control. For a flight of the duration of that contemplated, this is a point that deserves consideration.

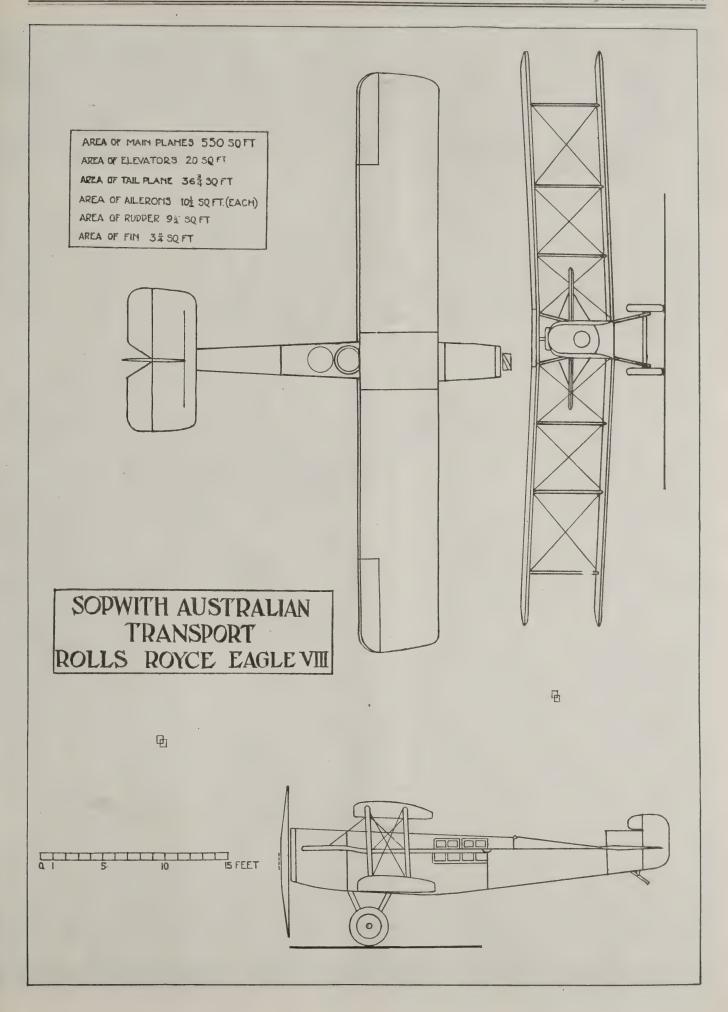
As the *fuselage* is of considerable cross section, the instruments carried occupy only a small portion of the dash in front of the pilot. The space thus left is utilized by proin front of the pilot. The space thus left is utilized by providing a locker, holding two ply-wood trays to which are pinned the maps of the country over which the machine is passing. Fixed to these trays with small metal clips are parallel rulers, dividers, etc., so that the pilot, who incidentally is also the navigator, has at his finger tips all the instruments required for working out his course. When not in use these maps are pushed into the locker and the door closed.

Triplex windows are provided in the sides of the fuselage, and a small window is also fitted in the floor in front of the pilot. The latter window is ruled with a set of lines, one running parallel with the longitudinal axis of the machine, and others forming various angles with it. By watching through this window the path traced out by objects on the ground the pilot can get a very good indication of the drift -that is to say, the angle between the course steered and the course made good.

A very interesting instrument is fitted to the Sopwith. This is known as a turn meter and consists of two swivelling tubes, terminating in a funnel at the rear, mounted one on each wing tip in front of the leading edge. These two tubes are connected up to an indicator in the cabin, on which the slightest turn is shown. This instrument should be very useful in case of flying in clouds, when a machine usually begins to swing off her course first to one side and then to the other, until the compass swings to such an extent that the pilot no longer knows quite what the machine is that the pilot no longer knows quite what the machine is (Continued on page 704) doing.



The Sopwith Australian Transport "Wallaby," equipped with Rolls-Royce Eagle VIII



# LAWS 6

THERE HAS
NEVER BEEN
A PERSON
HURT IN A
LAWSON
AIRPLANE



HERE IS A FACT — AN ACTUAL PHOTOGRALAWSON AIRLINER PASSING OVER NEW YORTRIP FROM MILWAUKEE TO WASHINGTON

LAWSON AIRLINE COMPANY

# CREATOR OF THE AIRLINER



OF THE GREAT <u>26</u> PASSENGER CARRYING RBOR ON ITS 2500 MILE HISTORY MAKING RETURN.

MILWAUKEE, WISCONSIN, U. S. A.

# B. A. T. "BABOON"

THE "Baboon," designed and built by the Brit Transport Co., Ltd., is a two-seater, dual conting plane. Its leading characteristics are as for	rol, train-
Engine: Type	"Wasp" I
H. P. Weight of Machine: Empty, lbs.	860
Range in miles	175
Speed (m.p.h.): Ground level	90
Climb (in mins.) to: 5,000 ft	5
Loads: Per sq. ft., lbs	5.2
Per h.p., lbs	400
Length (overall), ft. ins	22′ 8″ 8′ 10″
Span: Top, ft. ins	25′ 0″
Chords: Top. ft. ins	5' 7"
Bottom, ft. ins	134

Bottom, sq. ft	125
Total sq. ft  Gap, ft. ins  Dihedral, degrees °.  Aileron area: Each, sq. ft  Total sq. ft.*  Area: Tail-plane, sq. ft.  Elevators, sq. ft.	4' 8½" 2° 6 24 27.75
Total sq. ft  Area: Fin, sq. ft  Rudder, sq. ft	39.75 5.25 6.0
Total sq. ft	2
Diameter Pitch Speed, r.p.m.	5′ 0″ 1,850
Tank capacity: Hours	



The British aerial transport two-seater, dual control, training machine, equipped with 170 H.P. A.B.C. Engine

#### **BOOK REVIEWS**

A STOP AT SUZANNE'S, by Greaver Clover. Letters and prose sketches of an American youth serving with the French

Camion Convoi and later as a cadet in the American aviation service. With an introduction by Samuel Travers Clover. Greayer Clover, like many another American lad, enlisted with his college friends in the French Camion Convoi and served six months, carrying ammunition and supplies up to the men in the trenches. When America entered the war he became a member of the American Aviations Corps, and met his death when his plane crashed to earth in a field back of the line.

These delightful sketches of the life of our American boys in France will find a sympathetic audience in the hearts of all whom the war has touched. He was a typical college student, with a marked literary ability, which developed rapidly in the gallant service in which he gave his

life.

No one can read this happy record of a work happily performed without feeling that it stands as the symbol of a wide national service and courage on the part of American youth.

This book may be purchased from the Aeronautic Library, Inc., 299 Madison Avenue, New York. Price \$1.60.

ELEMENTS OF RADIOTELEGRAPHY. By Ellery W. Stone.

This text book was prepared for the use of raido students at the Naval Radio School at San Diego and is based on the lecture course in radio theory. The excellent paper, the clear bold face type, the well chosen illustrations and the durable binding makes the work of particular adaptability to the student who desires to refer frequently to the text after he is engaged in the practice of the radio art.

The first part of the book is devoted to a study of electrical terms, to elementary alternating current theory of power and then radio frequencies. Sufficient attention is given to the mathematical side of the subject that the student is able to cope with the average mathematical problems which are encountered in practical radio operating. The development of the theory, however, avoids mathematical demonstration in preference to comparison with the more familiar physical parallels which appeal more clearly to the

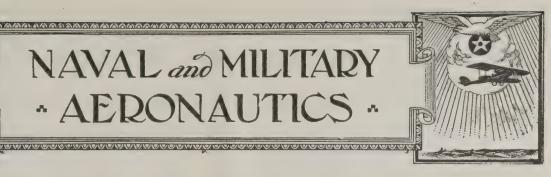
less technical layman. Then follows a series of chapters which describe the advances made in radio science from Marconi's 1896 transmitter to the modern panel commercial equipments. These chapters not only show the advancement of the science, but the particular functions and theories of each step, so that the student, having taken up practice and theory side by side, is ready for operating practice. A section is devoted to high power continuous wave transmitters, and finally a section on receiving equipments from the most pioneer and elementary to the most advanced and modern receivers. The theory and operation of the vacuum tube in all its functions is very clearly explained.

Obtainable at the Aeronautic Library, Inc., 299 Madison Avenue, New York

J. D. Reid, who has been attached to the technical section of the Air Service at Paris, has been discharged from government employ and has accepted a position with the engineering force of Brewster & Co. He is stationed at their factory at Long Island City, N. Y.



# NAVAL and MILITARY AERONAUTICS



#### State Guard Completes Plans for Aero Unit

Plans for the establishment of an aero unit to be incorporated in the New York National Guard Division already have been completed, and the unit will be or-ganized immediately after authorization from the War Department has been re-

Final authorization will depend upon the enactment by Congress of the bills now before it for the reorganization of the army. The training system in the Na-tional Guard units will be based upon the standard system of the regular army. The National Guard units will have the same type machines and other equipment as the United States Air Service.

#### Reorganization of First and Fifth Aero Squadrons

The First Aero Squadron has been designated as a long-distance bombardment squadron, and reorganized with available personnel at this field. At present there are assigned to it twelve (12) pilots and two (2) observers. The executive personnel is as follows:

Commanding Officer: Capt. A. E. Simonin, A. S. A.
Adjutant: First Lieut. Russell L.
Maughan, A. S. A.

Operations Officer: First Lieut. A. M. Roberts, A. S. A.

Roberts, A. S. A.
Engineer and Supply Officer: Second
Lieut. Lucas V. Beau, Jr., A. S. A.
Commanding Officer, "A" Flight: First
Lieut. A. M. Roberts, A. S. A.
Commanding Officer, "B" Flight: First
Lieut. Eugene H. Barksdale, A. S. A.
Executive personnel of the Fifth Aero
Squadron, as follows:

Squadron, as follows

Commanding Officer: Capt. Harry M. Smith, A. S. A

Adjutant: First Lieut. C. L. Midcap, A. S. A.
Operations Officer: First Lieut. Paul
J. Mathis, A. S. A.

This squadron has been designated to patrol the coast from Mitchel Field, at Long Island, to Langley Field, at Hampton, Va. At the present time, both the First and Fifth Aero Squadrons are doing this work. In spite of the very bad weather only twice have these patrols been uncompleted. In some cases as many as three snowstorms have been en-

countered en route.

A school for instruction has been established at this field to carry out a training program as directed by the Director of Air Service. At present about twenty-eight (28) officers attend this school daily. A great deal of interest has been shown on the part of all and it is expected that marked progress will be made in this

training.

#### Record Altitude Made by the 8th Aero Squadron.

The 8th Aero Squadron on duty at Mc-Allen, Texas, seems to have surpassed all other squadrons in the United States in reaching high flying. Lieut. Fonda B. Johnson flying a DH-4 reached an altitude of 16,700 feet for "Flight B". The greater part of the flight was made be-

tween two layers of clouds, the lower strata which was of 1000 feet thickness strata which was of 1000 feet thickness being penetrated at an altitude of 9000 feet and the upper layer was reached at 16,700 feet but could not be penetrated because of darkness. His record almost reached that made by Lieut. James Haizlip "Flight A" last week when he attained an altitude of 18,500 feet. This record to date stands unbeaten by any squadron in this country and speaks well of the work done by the 8th Aero Squadron.

#### Parachute Tests Being Conducted at McCook Field

The Engineering Division of the Air Service at Dayton, Ohio, has conducted two successful parachute jumps, using a

new pack type parachute.

Sergeant (1st class) Ralph Bottriel and James Russell, a civilian, ascended to an altitude of 2,000 feet in a Martin Bomber aeroplane equipped with these pack type parachutes, which were developed by the engineering section for use on all type of aeroplanes. Mr. Russell jumped from the wing tip of the Martin Bomber, landing on the ground in one minute and 23 3/5 seconds, while Sergeant Bottriel followed him by jumping from the rear gunner's cockpit and landed in one minute and 24 seconds.

A great deal of interest has been aroused in connection with the test at this field, and at the present time ten non-commissioned officers are under instruction in connection with their use under the instruction of Air Service engineers.

Upon completing their course, they will be sent to the various fields where they will not as instructors.

they will act as instructors.

Austrian Seaplanes for U.S. Navy

The United States Navy now has two Austrian seaplanes which have been cured by the commander of the United States Naval forces in the Eastern Mediterranean, Rear-Admiral Philip Andrews, by arrangement with the Italian Government. One of the seaplanes has a 12-cylindered 450 h.p. Austro-Daimler motor, while the other has a six-cylindered 250 h.p. Hiero motor.

R. A. F. Up to Authorized Strength

The British Air Ministry in a recent report relative to a recruiting campaign, opened a short time ago by the Royal Air Force, announced that recruits have applied in such numbers that the force is now up to its authorized strength.

The attractive new conditions of service and rates of pay are responsible for this result and the authorities are well pleased with the class of men applying.

#### Personal Pars

Capt. Harvey W. Cook, A. S. A., who is credited with the destruction of four enecredited with the destruction of four enemy balloons and three planes, has received his discharge and left Kelly Field for the Texas oil fields. Captain Cook is from Anderson, Ind., and was with the French driving an ambulance when the United States declared war on Germany. At that time he joined the U. S. Flying Corps at Issoudun. He was later engaged in ferrying ships to the front and from in ferrying ships to the front and from the supply depots in France and England. About the middle of July, 1918, he joined the 94th "Hat-in-the-Ring Squadron" and was with this squadron during the remainder of the war.



Flight Commanders and Mascot of the 1st Aero Squadron at Mineola. From left to right: 2d Lieut. Willis R. Taylor, Deputy Flight Commander; 1st Lt. Alex. M. Roberts, Operations Officer, Flight "A" Commander; 1st Lieut. Eugene H. Barksdale, Flight "B" Commander; Miss Isabel Sherman, Squadron Mascot; 1st Lt. Phillips Melville (twin-engined aeroplane pilot) attached to squadron



#### FOREIGN **NEWS**



#### New German Monoplane Built of Aluminum

New German Monoplane Built of Aluminum

Through the forced landing of a new German monoplane which fell into the hands of Lithuanians at Abele. near Dvinsk, details of the construction have leaked out. This machine, which is said to have attained a height of 7,000 metres with eight persons aboard, is from the firm of Junkers Flugzeug-Sverke A.G., of Dessau. It is constructed almost entirely of corrugated aluminum, and has a total weight, without fuel and passengers, of about one ton. The wings are of unusual thickness, but their apparent solidity near the fuselage on either side is deceptive, for in reality they are hollow and contain the gasoline tanks, a spare propeller, and a spare set of wheels. The body of the monoplane, which rises high above the wings, contains a snug little cabin fitted up very much like the interior of a luxurious limousine, with upholstered arm-chair accommodation for six passengers. The "cockpit" seats two pilots and is also perfectly screened from the wind. Thanks to the absence of visible wires—those used being hidden in the wings and fuselage—the monoplane has an aspect of weight and massiveness weirdly at variance with the idea of flight.

China Plans Military and Trade Aviation

China is preparing to greatly enlarge and develop both military and commercial aviation. The Ministries of War and Communications have completed plans for the establishment of an efficient air service for the Republic of China and information indicates that President Hsu Shih Chang is promoting the construction of a modern aerial service between Peking, Tientsin, Shanghai, Hongkong and Canton. The Minister of War is enlarging the Chinese aviation school at Nan-yuan, where aviation instruction is given for both military and civil purposes.

The order for aeroplanes given by the Chinese Government to Vickers-Vimy type of planes, 42 ft. long, 15 ft. high, and 67 ft. wide, carrying two Rolls Royce engines, with a total of 750 h.p. Their maximum speed is 115 m.p.h. They carry two pilots and seat twelve passengers in the cabin, which is enclosed. The maximum weight of freight and mail combined will be 2600 lbs.

#### Refuse to Allow Police Aeroplane Service in Germany

Paris.—The Council of Ambassadors considered the demand of the Germans and Austrians that they be allowed to preserve aeroplanes for aerial police service.

The demand was rejected as contrary to the terms of the peace

treaties.

#### Record Mediterranean Flight

Cairo.—The two aeroplanes belonging to the South African government which are attempting a flight from London to Cape Town crossed the Mediterranean in fourteen hours. This is said to be the first nonstop flight over the Mediterranean.

In view of the fact that part of the navigation was made during the night in a furious wind, which one of the pilots said blew his aeroplane backward for ninety minutes, the passage is regarded as a remarkable achievement.

Swiss Organize for Aviation Development

Although the commercial use of aeroplanes in Switzerland is still in its infancy, many manufacturers are organizing and planning for extensive trade.

A school has been established known as the Ecole "Aero" Lausanne, where pilots will be trained with "Aero" made aeroplanes, which are biplanes with double steering gear.

Another concern has been established under the name of "Aero" Luftbildverlagsanstalt, which will devote itself primarily to aerial photography and which is using German biplanes with a capacity for a pilot and two passengers.

An aerial passenger concern has been established in Geneva under the name of Avion Tourisme, which is making regular flights with a hydroaeroplane equipped with two 200 hp. Isotta-Frachini engines.

#### Outline British Air Routes

Outline British Air Routes

The report of the British Advisory Committee on Civil Aviation, on the establishment of Imperial Air Routes, deals with the use of heavier-than-air machines, and the establishment of main trunk lines between the various portions of the British Empire, including Canada, Newfoundland, South Africa, India, Australia and New Zealand.

The report believes that the proper route for initial action is between England and India and ultimately from India to Australia, with second choice a route from England to South Africa, which between England and Egypt, would be over the same route as is contemplated to India. The committee decided against the use of the Royal Air Force squadron for civil purposes. It considered operation by the State itself, the formation of a chartered company combining State and private capital, and private enterprise aided by the State.

The committee also suggests that a certain quantity of the aircraft engines and material which have been declared surplus by the Royal Air Force should be placed at the disposal of the Civil Aviation Department for distribution free in England and India should be removed.

#### Aeroplanes to Carry Freight

Air routes on which freight will be carried between London, Paris and Brussels are to be established next spring.

#### Ban on Civilian Flights Lifted in India

Civil aviation in India was prohibited pending the issue of rules which have now been published, and firms which made preparation in advance for the introduction of non-official flying have been able to make a

for the introduction of non-official flying have been able to make a beginning.

The rules provide for the licensing of pilots, the inspection of machines, the regulation of air traffic and the general protection of the public. No pilot's license will be granted to any one who is not a British subject, except under a general or special order of the Governor General in council. An applicant will have to prove his mental and physical fitness,

and he may be required to submit proof of recent flying experience or to

and he may be required to submit proof of recent flying experience or to undergo practical tests.

Special officers are to be appointed to inspect and overhaul passenger aircraft periodically. As regards traffic in the air flying machines are always to give way to airships and airships to balloons, wether fixed or free.

The route of the Karachi-Bombay service will be overland via Navanagar if the Maharajah of the state approves of the establishment of an intermediary aerodrome at his capital.

#### Hydroaeroplanes In Amazon Service

Hydroaeroplanes In Amazon Service

Para, Brazil.—Aeroplanes may be employed to map the valley of the great Amazon river. If the French are successful in their effort to use aircraft for surveying the routes of the rivers of French Guiana, it is understood the Brazilian government will apply the same method to the survey of the Amazon and its affluents. A French company is said to have been formed in Cayenne, with hangars on the Maroni river, and French aviators with flying experience gained in the war are being employed.

In addition to making maps, the machines will be employed for carrying freight, mails and passengers. There are immense rivers in French Guiana which, because of the presence of many rapids, are now only navigable in canoes which take weeks to transport freight over distances which the hydroaeroplanes can cover in as many hours, with always large stretches of smooth water offering a suitable surface for landings and "take-offs."

The traffic is expected to consist mainly of gold, balato and essence of rosewood, which are the principal exports of the colony.

British Aeroplanes on Trip to Cape Town.

London.—A South African Government aeroplane left the Brooklands aerodrome and arrived in Turin, Italy, the same day, after a one-stop flight. The plane is attempting to fly to Cape Town, South Africa.

First attempts to fly from Cairo to Cape Town will be watched in England with interest.

The Daily Times already has a big aeroplane at Cairo, which flew there from England. It will start on the first lap of the southward journey to Atbara, 870 miles up the Nile. It will carry a crew of five and a scientific observer.

Peter Chalmers Mitchell, astronomer and secretary to the Zoological Society of London, was passenger in a plane which left for Cape Town, rising from an aviation field near this city.

Construction of landing places and accumulations of gasoline and stores throughout the route to be followed has just been completed.

The British aeroplane DH-14 left Lympne, in Kent, for Cape Town.

#### Plan Exploring Tibet with Aeroplanes

Shanghai.—Huge passenger aeroplanes probably will be bused by Roy Chapman Andrews, of the American Museum of Natural History, New York City, in exploring Tibet next summer. Mr. Andrews says his next expedition probably will make its way into the heart of Chinese Turkestan and that he will be accompanied by fifty scientists.

#### Police Aeroplanes Over Berlin

As a sequel to the riots in Berlin last week, low-flying police aero-planes were engaged in patrolling over the roofs of the city on January 15, watching for an attempt to renew the Spartacist disturbances on the anniversary of the death of Rosa Luxemburg.

#### The \$2,500 One-Man Aeroplane

The \$2,500 One-Man Aeroplane

A machine which is the aerial equivalent of the canoe or skiff or the small car has been put on the market by the Austin Motor Co. Ltd, under the name of the "Austin Whippet," and a first batch of fifty are actually under construction after a series of exacting experimental flights. A good deal of flying of one sort and another has now been done with the Whippet.

This handy little single-seater recently made the journey from the Company's flying ground at Longbridge, Birmingham, to Bristol, a distance of ninety miles, in a cross wind in one hour. Though the "Austin Whippet" answers its controls readily the machine is inherently stable, and can be flown with hands off the joy-stick. An ordinary amount of common-sense is all that is required to fly it, and it lands at the convenient speed of 35 m.p.h. Its range of flight with standard tanks is 182 miles.

The fuselage is constructed throughout of steel tubes, and the wings of 21½ ft. span are designed with a strength to take seven times the load they actually sustain. For storing the machine the wings can be folded back by one man and the machine's dimensions are then 16 ft. 3 in. long, 7 ft. 6 in. high and 8 ft. width, so that it will go into a small shed.

All calculations for the design of the Whippet have been checked and approved by the Air Ministry, who have granted a certificate of airworthiness to the machine.

#### French Planes to Fly Across Sahara

Paris.—Three Breguet biplanes left Villa Coublay for Timbuctoo. The proposed route is via Lyons, Istros, over the eastern coast of Spain to Rabat, thence to Algiers, Biskra, Insalah, Tesnou, Tanzouaten, Timbuctoo and Dakar. Major Vuelleman-Fotmous is in command of the expedition.

He has six aerial victories, 200 bombardments and seventeen mentions in despatches already to his credit, as well as the finest French flight since the armistic, that from Paris to Constantinople and Cairo and back. Accompanying him are Capt. Mezergues and Lieut. Dagnaux, a daring pilot with a wooden leg.

The expedition is one of considerable military importance and it is expected that Gen. Neville will cross the Sahara to Timbuctoo by aeroplane once the air trail has been blazed. As it is the journey across the desert by camel caravan takes several months and inevitably means considerable hardships. So far attempts at aerial crossings of the Sahara have been attended by ill fortune.

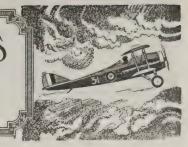


# ELEMENTARY AERONAUTICS

## MODEL NOTES

By John F. M-Mahon

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#### Designing a Model Aeroplane (Continued)

Excerpt from F. J. Conner's book on Model Aeroplanes

It is usual to make the diameter of an air screw equal to one-third the span, and the pitch one and a half times the diameter. For twin screw models no hard and fast rule exists with regard to diameter, for, since the torques of the oppositely revolving screws will counteract one another, they can be made of rather large diameter and fairly long pitch, although it is not advisable to make the pitch longer than the circumferential measurement of the disc swept by the screw; that is to say, the pitch angle should not exceed 45°.

Another rule which is vitally important to the success of the machine is that the centre of pressure must be coincident with the centre of gravity. The centre of gravity is easily located by balancing the model on a knife edge, but the centre of pressure is more difficult to determine. It is generally situated at a point one-third the chord from the leading edge, hence the wing should be temporarily fixed—with this point directly over the centre of gravity, the mainplane being adjusted to its correct position afterwards. The maximum camber or curvature of the ribs should also be placed as nearly as possible on the c.p., the greatest depth of camber being made from one-twelfth to one-sixteenth of the chord. For very deep cambers double ribbing and double surfacing are essential, the bottom camber being made about one-half that of the top.

Referring to the question of the most suitable loading for general purposes, i.e., for models not designed purposely for distance or duration, it is general practice to use a loading of from 4 oz. to 6 oz. per sq. ft. I certainly would not advocate a lighter loading than 4 oz. per sq. ft., for I have noticed that great difficulty is experienced in tuning or adjusting models loaded under this figure, a certain sluggishness being apparent; apart from which they require to be flown in comparatively calm weather conditions, this point alone constituting a big disadvantage. The writer personally prefers a loading of 6 oz. per sq. ft. (referred to by many as the ideal loading), no difficulty having been experienced in flying models thus loaded in winds up to fifteen miles an hour. For racing models I have used 10 oz. per sq. ft., and for duration models 6 oz. per sq. ft., and these loadings have, apparently, given the best results. I recall a case in point which substantiates the above inference re light loading. The writer had a large rubber-driven model which flew considerably better when the loading was increased by placing a dead weight of 3 oz. over the centre of gravity. There is one other point worthy of note in connection with this model. It weighed some 20 oz., and was driven by two skeins of rubber, each consisting of ten strands of ¼-in. strip, the power being transmitted through equal gearing to the tractor screw. These skeins took thirty seconds to run down when wound to 600 turns; and yet a model of similar weight, length, etc., constructed by a friend, driven by two skeins of six strands each, transmitting their power to a similar propeller through a reduction gearing of two to one, under a similar test gave exactly the same results, viz., thirty seconds for 600 turns. The two skeins of rubber were equally geared to obviate torque on the fuselage, the reduction being by means of a larger gear screwed to the propeller boss, which meshed with one of the smaller ones.

With regard to the weight limits for rubber-driven models, the heaviest known model to date that has flown successfully is that built by W. E. and J. Rogers, who built a huge tractor biplane weighing no less than 2 lb. 4 oz. It had a built-up fuselage covered with aluminium foil, four 12-yd. skeins of rubber equally geared to the propeller, and was 6 ft. in span. I had the pleasure of witnessing some of its best flights, and, judging from its behaviour in the air, one would have thought it to be no more than a 4-oz. model. Its best flights to date is 200 yards, duration about twenty seconds. Some of the writer's best flights have been made with a model which weighed nearly 20 oz. The results of the weight-lifting competitions have proved that it is merely a matter of careful design to obtain good results from heavy machines; besides which there exists more room for ingenuity with large models than with small ones. Further, there is evi-

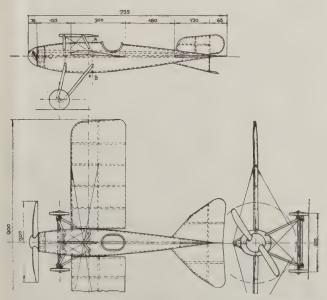
dence that the K.M.A.A., when it resumes its activities, will encourage the construction of much larger models than is at present the case,

The question of weight, then, is one which to some extent must be left to the reader, although from the foregoing it will be gathered that a reasonable weight that admits of rational design would be from 1 lb. to 1½ lb. Great controversy formerly raged round the question of weight versus surface rating for competition models, but the point was ultimately partly settled by the weight and surface of competing machines being limited in some of the Association's contests.

Alluding to the important question of the best type of model for appearance in the air, the tractor stands pre-eminent, albeit it is a little more difficult to fly. This is partly due to the fact that the revolutions per minute of the screw are decreasing from the moment the model is released, whence the slip stream and, consequently, the lift of the main plane is not constant, this tending towards bad longitudinal stability. This tendency, however, can be counteracted by an adjustment to the angle on the tail, which should always be a negative one. The rudder should be placed above the centre of gravity and must not be made too large. It is difficult to specify with regard to the area of the rudder, the length of machine, screw diameter, and speed being three salient points upon which it is dependent. Bad lateral stability, too, is often attributable to a wrongly proportioned rudder. The centre of thrust should be placed slightly above the centre of gravity to counteract the tendency to "stall." Care should also be taken to fit a screw of the correct pitch; too fine a pitch causes a stall and a resultant dive.

A type of model very successful in open competition is the 0—1—1—P2, flown with great success by Mr. A. F. Houlberg. A very fine adjustment seems necessary with this type, and it will be found that a swept back wing of the Handley Page type gives best results. It should be borne in mind that negative tips are essential with this form of wing, as is a very slight dihedral angle. One cannot say that this type presents an altogether pleasing aspect in the air, the long projecting spar "with nothing on it" detracting much from its appearance. However, one must judge from results, and the 0—1—1—P2 has achieved much in open competition, although the British record of 2 min. 49 secs. is held by a "tail first" machine. It is intended, however, in a future chapter to give sketches and a discussion on the merits, or otherwise, of the various types.

(To be continued)



Drawings of a successful German model. The dimensions are given in milimeters; to get inches divide by 25. For instance, 200 divided by 25 = 4 inches



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Rawther Upsetting

To take a maid up in a Is foolish without doubt; It is a most unhealthy place To have a falling out.

Some Brand

"How do you like that cigar I gave you, old man? For 200 bands off that brand they give you a gramophone."
"You don't say! If I smoked 200 of those cigars I wouldn't want a gramophone; I'd want a harp."—Houston Post.

He-"I want some underwear."

She—"How long?"
He—"I don't want to rent it."—Voodoo.

Back Again

Well, now I've quit the uniform,
I'm with the folks again; The With the folks again;
I've met my girl, I've seen the town,
They've almost made me vain
With praisin' up the stunts I did.
There's not a thing I've missed,
And yet—say, Bud, oh hang it all,
I'd like to re-enlist!

I've got a job, an' "settled," but I'm restless just the same, For after chasin' Heinies there I must admit it's tame.

An' out of doors—that gas vou know—
These times—the Bolshevist—
The country's flag—Oh, hang it all,
Say, Bud, I'll re-enlist!

-Alfred N. Phillips, Jr.

#### MAYOR HYLAN'S SKY COPS.



(Courtesy N. Y. World)

The Missing Deacon

One of the prominent deacons in an Ohio church was seri-One of the prominent deacons in an Ohio church was seriously ill. As he was very popular among the congregation, a bulletin board was posted in front of the church to inform his friends of his condition. It read:

"One o'clock. Deacon Jones very ill."

"Two o'clock. Deacon Jones is worse and sinking rapidly."

"Three o'clock. Deacon Jones dead."

A traveling man passing by that evening read the bulletin and, seeing no one in sight, added at the bottom:

"Seven o'clock. Great excitement in Heaven. Deacon Jones has not yet arrived. The worst is feared."

Unnecessary Warning

"This seems to be a very dangerous precipice," remarked are tourist. "I wonder that they have not put up a warning the tourist.

"Yes," answered the guide, "it is dangerous. They kept a warning board up for two years, but no one fell over, so it was taken down.

Kamarad!

Two Tommies went into a restaurant on the eastern front and said to the waiter, "We want Turkey with Greece." "Sorry," the waiter replied, "but we can't Servia." "Well, then, get the Bosphorus." The boss came in and heard their order. Then he said "I don't want to Russia, but you can't Rumania." So the two Tommies went away Hungary.

Some Mess

Customer: "Waiter, give me some hash, please." Waiter (ex-army cook), shouting back to the cook: "Clean up the kitchen."-American Legion.

"Yes, my dear, that is a man-of-war."
"How splendid! And what is that little one just in front?"
"Oh, that's just a tug."
"Oh, yes, a tug of

"Oh, yes, a tug-of-war. I've heard of them."-American

The astronomers are expected to aid in the hunt for moonshiners.

Another Expense

Mrs. Hayseed (reading a letter from her son)—"Bill's got a furlough and he's comin' home for a few days."

Mr. Hayseed—"Got a furlough, eh? Well, he needn't expect me ter buy gasoline fer the durned thing."

Some Sensation

"Did you read about that French Army aviator who made 314 loops in one flight the other day?"

"Lucky dog! I've had that sensation myself, but not since last June."

The officer of the deck, desiring the reading of the compass, sent a hospital attendant, the only man within call, to the cabin to get the reading. The attendant returning reported the reading normal.

"What do you mean by normal?" asked the surprised

"Ninety-eight degrees, sir."—Judge.

The Reason

She-George, you looked awfully foolish when you pro-He-Well, very likely I was.-London Opinion.

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**BRANCH OFFICE: AVIATION DEPARTMENT** 280 Madison Avenue Telephone, VANDERBILT 322

(Continued from page 685)

greatest maximum speed obtainable combined with slowest landing speed for safety.

"We in Texas want to win the Gordon Bennett Aviation Trophy for the United States and bring the next international aviation race to Texas. To achieve this, I am willing to pay \$100,000."

France has won the trophy twice in succession and if she wins it this year the trophy will become the permanent property of the Aero Club of France. It is known that France will make every effort to win it and it is understood that aeroplanes capable of great speed are being designed by the best French aeronautic engineers for this race.

England and Italy are also employing their best aeronautic talent to design and build cup winners. Among the other fourteen countries which are scheduled to compete there are also expert aeronautic engineers figuring on speedy races for

also expert aeronautic engineers figuring on speedy races for this contest. Mr. Augustus Post, Secretary of the Club, who this contest. Mr. Augustus Post, Secretary of the Club, who has just returned from Europe, where he flew from France to England, then to Belgium and to Italy, Switzerland and Sweden, reports that to win the Gordon Bennett Cup it will require a speed of 200 miles an hour. Mr. Cox owns three aeroplanes, which he uses every day in Texas in connection with his oil operations which extend over 200 miles of land owned or leased by his company. It will be recalled that Mrs. Cox flew from Houston to New York a few months ago, to take her son to school take her son to school.

The Gordon Bennett Aviation Cup Race is to be held in France in September. Three entries are allowed to each of the eighteen national aero clubs of the International Aeronauthe eighteen national acto club selects the three contestants for the country it represents. The Aero Club of America has won two contests out of five, in 1909, which was won by Glenn H. Curtiss, and France also won two and England one. In the last race held before the war, Maurice Prevost, the French aviator, made a speed of 124 miles. In 1911 it was won by Charles T. Weymann.

won by Charles T. Weymann.

The type of aeroplane ordered by Mr. Cox is kept secret, but it is known that the order has been placed for two machines capable of a speed of not less than 200 miles an hour. "They will be of American design, American manufacture, equipped with American motors and made entirely of American material, and will be flown by an American aviator," Mr. Cox told the Contest Committee of the Aero Club of American

ica, "they will be aeroplanes of a speed of not less than 200 miles an hour, but capable of slow landing speed, which will

"While being willing to spend \$100,000 to bring back the Gordon Bennett Trophy, I am also anxious to develop an aeroplane at the same time which will represent a marked advancement from the standpoint of aeronautic engineering and usefulness.

Mr. Henry Woodhouse points out that the designing and constructing of an aeroplane capable of making 200 miles an hour will be stupendous history making achievement in the science of aeronautics. "To fully understand the significance of such an achievement one must consider the fact that there of such an achievement one must consider the fact that there is not in existence today engineering data upon which the design and construction of an aeroplane of 150 miles per hour speed can be based. Nor are there aerodynamic laboratory means of testing a model of an aeroplane intended to make 150 miles or over per hour. The fastest wind tunnel for testing aeroplane models and determining their efficiency has wind speed of less than 150 miles an hour. The engineers and constructors of the 200 mile per hour racer will, therefore, be writing history in aeronautic engineering when design-

ore, be writing history in aeronautic engineering when designing and building these machines.

"This development will also be of great value from a military standpoint. Practically all the engineering data and experience which enabled the Allies to build fast military and naval aeroplanes in the first two years of the war had been obtained from designing and building fast aeroplanes and seaplanes for racing before the war.

"Sportsmen gave aeronautic engineers inducements and a

"Sportsmen gave aeronautic engineers inducements and a free hand. They asked them to produce their best and the engineers did their best and each succeeding Gordon Bennett Trophy race brought great increase of speed combined with

efficiency of design and improvements in air worthiness.

"The Gordon Bennett Trophy was won in 1909 by Curtiss with a speed of less than 50 miles per hour; in 1910 by Grahame-White with less than 63 miles per hour; in 1911 by Weymann with a speed of less than 79 miles an hour; in 1912 by Vedrines with a speed of close to 110 miles an hour, in 1913 by Prevost with a speed of over 110 miles an hour!

"Now that over two thousand aeroplanes have been purchased for sport pleasure touring and transportation, and the

chased for sport, pleasure, touring and transportation, and the demand is increasing daily, it is a good investment to a manufacturer to produce an international winning aeroplane. It creates a market for his aeroplanes the world over."

## THE MACHINE YOU WILL EVENTUALLY FLY!!



## MARYLAND PRESSED STEEL CO., (AIRCRAFT DEPT.)

Sales Manager, HARRY E. TUDOR

299 MADISON AVE., NEW YORK CITY

(Continued from page 694)

The Rolls-Royce "Eagle," Mark VIII, is placed immediately behind a nose radiator, and is supplied with gasoline from a gravity tank placed in the top centre section. Petrol is forced from the main tank, which is placed between the engine and the cabin and has a capacity of about 200 gallons, to this top tank. A very ingenious flow meter is fitted on the latter, indicating at any time the rate at which the fuel is being consumed. In the top centre section is also placed a water tank holding about 25 gallons of water, connected up to the radiator by a flexible rubber tube. Another tube, it might be mentioned incidentally, runs from the nose of the machine, through the engine housing and to the cabin, supplying the latter with fresh air. Two long exhaust pipes run back to the rear of the cabin, and serve as very effective silencers, the noise inside when the two panels in the roof are closed being almost negligible.

As will be seen from the scale drawings, the Sopwith is a three-strutter, the large span making this arrangement advisable. The under carriage is of the usual simple Vee type, with rather a narrow track. Wing tip hoops have therefore been fitted.

For the rest, the Sopwith follows standard practice in design and construction. The tail plane is provided with the usual trimming gear, the wheel control of which may be seen in the side view of the machine. There is a rectangular-shape vertical fin, to which is hinged the balanced rudder.

shape vertical fin, to which is hinged the balanced rudder. As will be seen from the general arrangement drawings, the total wing area is 550 sq. ft. The weight of the machine, empty, is 2,780 lbs., which gives a wing loading, empty, of 5.05 lbs./sq ft. and a power loading, empty, of 7.75 lbs./h.p. As already mentioned, the tanks have a capacity of 200 gallons, and with the weight of occupants and full equipment the weight "all on" is 5,200 lbs. This gives a wing loading of 9.45 lbs./sq. ft. and a power loading of 14.5 lbs./h.p. With full load the maximum speed is about 121 m.p.m., and the minimum speed 48 m.p.h. The cruising speed at 5,000 ft. and at a petrol consumption of 15 gallons per hour, is 107 m.p.h., which gives a range of about 1,500 miles. This is ample for any overseas distance that has to be covered during the flight to Australia, and should also give a very good margin for any of the overland stages over country unsuitable for landing.

As an example of the efficiency of the Sopwith "Wallaby" it is of more than passing interest to note that the ratio

Useful Load 2,420

 $\frac{1}{1}$  Total Weight  $\frac{1}{5,200}$  = 46.5 per cent., which is distinctly

good. Incidentally, it might be mentioned that the usefulness of the "Wallaby" is by no means restricted to the flight to Australia. By altering the cabin and seating accommodation it is possible to get in eight people (including the pilot), when the machine would have a range of 500 miles at a speed of 107 m.p.h.

# Aircraft Industry Flourishing (Editorial in Rochester Times)

In view of statements made before military committees of Congress to the efffect that the aircraft industry of the United States had been allowed to go to ruin it is interesting to note that a report made by the Aero Club of America says that the "aircraft demanded for civilian purposes is large enough to support the aircraft industry of the United States on a permanent basis."

This report covers the situation down to the end of last month, so that it may be regarded as giving up-to-date information. It states that during the past year the aircraft industry was obliged to turn down \$50,000,000 in orders because of inability to make deliveries.

Presumably the Aero Club has made a careful investigation and is not painting the situation in too rosy colors. No doubt certain factories or portions of factories devoted to producing aeroplanes of strictly military type have been closed down.

Yet it seems clear that the manufacture of aeroplanes for commercial purposes and general private use has really arrived and has good prospect of steady growth.

America's automobile trade far surpasses that of other countries. Now it seems likely that if our aircraft manufacturers are able to keep up with the times this country will take a decisive lead in output in this new field.

# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington	350	miles
(four times)	450 1260	miles miles
Washington to Dayton and return (two times)	1000	miles

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

#### The Glenn L. Martin Company Cleveland

Contractors to the U.S. Army, Navy and Post Office Departments,

FIRST IN WAR

FIRST IN PEACE

# Quality Tells in the Long Pioneering Flights

#### The American-French Aero Exposition, announces that it has purchased Inc.,

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Word to the Wise **Dropped** from the Skies

The aeroplane is in itself a novelty. Circular spinning and diving from a machine, when witnessed by an observer, represents a peculiar value, the cause of which it is difficult to describe. Advertising distributed from our aeroplanes is surrounded by an atmosphere of romance sufficient to cause people who ordinarily would not even glance at advertising literature to scramble eagerly in their efforts to secure as many copies as possible. These are taken to their homes and

offices, where they are exhibited to visitors as costly souvenirs.

The experience gained while touring some of the Southern States as the Fifth Liberty Loan Circus, demonstrated that "bombs" and dodgers and other advertising material fluttering from

the sky into crowds is practical.

From your own experience, you realize that AERIAL ADVERTISING is a striking and efficacious method of presenting your product to the masses, and we have worked out several novelties unique in color and original in design, which will interest you. Compared with the results obtained, our rates are lower than you are now paying for newspaper and magazine space, and we can accomplish your aim efficiently and at less expense than you can do it by any

We have a large staff of aviators and practical men in our employ for the mechanical part of our work, and in addition we have the advertising men and means of making your aerial advertising of extraordinary value. One of our representatives will gladly call upon you and outline our plan, without obligation.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to special Aerial Routes in the United States furnished on application to prospective advertisers.)



THREE SEATER—150 H.P. HISPANO ENGINE

# LINCOLN-STANDARD H. S. Biplane

The Original Standard J-1 Government Training 'Plane

Can furnish either two or three seater. Orders received now and delivered promptly.

Airplane Spares; Extra Engines; Hangars; Wire Cables; Wheels; All Kinds Aircraft Material.

Write at once and let us know your wants.

# Nebraska Aircraft Corporation

Lincoln, Nebr.

(Continued from page 690)

Praeger denied statements of its critics regarding aerial mail flight failures, declaring that it has been 90 per cent efficient, with only forty-four failures in 600 flights during the last six months.

flights during the last six months.

A powerful mail plane, Praeger said, is being developed to carry mail over the mountains to San Francisco, and a new British triplane is to be tried out between Chicago and Omaha.

For the first time in this country snow skids are being used on mail planes, Praeger said, to facilitate landings.

#### Census Blanks By Aeroplane

MIAMI, Fla.—Personal enumeration blanks were recently sent by aeroplane from Miami to Bimini, in the Bahama Island group, 40 miles distant, to be used in taking the census of Floridians employed there.

#### Wanamaker Fliers Make Safe Landing

The seaplane, manned by six members of the winter colony at Palm Beach, Florida, which had been sought following its disappearance on a flight from the Bahamas to the Florida mainland, made port under its own power at Vero, a town seventy miles north of Palm Beach.

The passengers were Redman Wanzan.

seventy miles north of Palm Beach.

The passengers were Rodman Wanamaker 2d, son of Thomas Wanamaker, of Philadelphia; Gurnee A. Munn, of Washington, son-in-law of Rodman Wanamaker, of New York; Philip Boyer, of New York, banker and president of the Hudson-Wright Airplane Company; Caleb S. Bragg, of New York, winner of the fourth international Grand Prix automobile road race and premier amateur driver of America, "Jack" Rutherford, of New

York, where he is prominent in society, and David H. McCulloch, pilot of the plane and a member of the crew of the naval seaplane NC-3 in the United States Navy transatlantic flight.

Wanamaker and his five companions put to sea for a trip to the Bahamas, which lie about 100 miles off shore. Their craft was a flying boat of the HS2-L navy type, equipped with a Liberty motor. The men took a lunch, a keg of drinking water and some fishing tackle.

Clifford Webster of New York, returning in another plane from Westend Island of the Bahama group, reported that the Wanamaker machine had left that island at 3 o'clock that afternoon on a return trip to Palm Beach.

The Navy Department at Washington was notified and promptly sent instructions to stations in the vicinity, suggesting that all possible aid be extended in the search for the missing plane. Private power boats, a few navy craft and a fleet of airplanes searched the area extending thirty miles east, north and south of Palm Beach.

Mr Munn said on his arrival that

Mr. Munn said on his arrival that while stranded and floating on the open sea, they had spied one of the searching airplanes and had tried to signal it, but without success. The seaplane was not equipped with wireless.

Mr. Munn said that engine trouble had developed just at dusk when the plane was within thirty miles of home. Darkness prevented the completion of repairs on the engine until morning.

#### Personal Paragraphs

Arthur Berndt, who was formerly an aeronautical mechanical engineer in the employ of the Bureau of Aircraft Pro-

duction, has left the United States and is now located in London.

. Harrison H. Boyce, vice-president and general manager, Moto-Meter Co., Inc., Long Island City, N. Y., has organized the Boyce-Veeder Corporation, also of that city. He has been elected president of the new organization and will divide his time between that and the Moto-Meter Co.

Gordon M. Evans has been discharged from the engineering division of the Ordnance Department with the rank of captain and has accepted a position in the Detroit office of the Aluminum Castings Co., Cleveland, Ohio.

#### Films by Air

Topical cinematograph films have been flown from France in Handley Page commercial aeroplanes to enable public events abroad to be shown on the screen in England within a few hours. It is anticipated that the co-operation of the aeroplane and the cinema will enable films of happenings abroad to be displayed to the public almost as soon as they are dealt with by the newspapers.

#### Plan Aid to Air Board

Ottawa.—The Canadian Research Council has appointed an air research committee of four to cooperate with the Dominion Air Board in the development of aeronautics throughout the country. The committee will have associate members in all parts of Canada and will undertake investigations independently as well as with the Air Board.

# WEEKLY

Vol. 10, No. 19

**FEBRUARY 23, 1920** 



An Aerial View of the Famous Observatory On the Top of Mount Wilson

Applications For Sanction Made to A.C.A. for Three Aerial Contests With Over \$100,000 In Prizes





# Assure Maximum Safety

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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

Published Weekly by THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., February 23, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X

NEW YORK, FEBRUARY 23, 1920

NO 19

# APPLICATIONS FOR SANCTION MADE TO A.C.A. FOR THREE AERIAL CONTESTS WITH OVER \$100,000 IN PRIZES

PPLICATIONS for sanction were received during the past week by the Aero Club of America for three aerial contests to be held under the rules of the International Aeronautic Federation with a total of over \$125,000 in prizes as follows:

(1) From the Aero Club of Southern California and the Aerial League of the Pacific Slope for an aerial rally and aviation meet to be held at Los Angeles in April. It is expected that the prizes will amount to \$50,000. Large prizes will be offered for the best flights made from anywhere to Los Angeles and the balance for the best records made during the meet to be held at Los Angeles. It is open to pilots holding the international pilot certificate issued by the Aero Club of America in the U. S. Applications for entry should be made to Mr. K. M. Turner, President Aero Club of Southern California, Hellman Building, Los Angeles, California.

From the Aero Club of the Northwest, for the Alaska Aerial Derby, from Seattle, Washington, to Juneau, Alaska, a distance of approximately 870 miles, and return to Seattle by way of Skagway, Sitka, Petersburg, Wrangell and Ketch-

This First Alaska Aerial Derby is to start on May 22 and is to be for seaplanes as the route is over water. Prizes are

expected to amount to \$35,000.

This event is open to pilots holding the international pilot certificate issued in the U. S. by the Aero Club of America. Applications for entry and for further details should be addressed to Mr. Teel Williams, President Aero Club of the Northwest, Seattle, Washington.

(3) From the Aero Club of Illinois for an aviation meet to be held in Chicago during July or August, the prizes for which are expected to amount to \$50,000. This event is to be open to pilots holding the international pilot certificate issued in the U. S. by the Aero Club of America. Applications for entry and for further information should be addressed to Mr. James S. Stephens, Vice-President Aero Club of Illinois, Chicago, Illinois.

During the month of June pilots will have opportunities to win prizes in the contests to be held at Atlantic City in connection with the Third Pan-American Aeronautic Congress and First Aerial Touring Congress, to be held at Atlantic City from June 1 to June 10.

Besides the above there are a dozen other important in-

ternational and national aerial contests scheduled to be held during the year as the Aero Club of America has issued over 7,000 pilot certificates, and over 1,000 people already own or have ordered aeroplanes. It is believed that there will be enough competitors to make a great success of each of these events from the standpoint of number of competi-

of these events from the tors.

The Aero Club of America grants sanctions for contests and issues pilot certificates by authority of the International Aeronautic Federation of which it has been the sole and official representative in the United States since 1905. Applications for sanctioner for pilot certificates should be addressed to Mr. Alan R. Hawley, Chairman Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.

Last year the Aero Club of America and the Aerial League of America offered over \$100,000 in prizes for aeroplanes, dirigibles and kite and free balloon contests, and organizations were anxious to enter but could not obtain aircraft, due to some extent to the fact that factories were unable to supply civilian demand in the spring and early summer during the liquidation of Government contracts, and the Army and Navy did not release surplus military aircraft until late in the season. The prizes were returned to the givers and the contests called off. There is no danger of this happening this year.

# \$100,000 AERIAL "DARK HORSE" WILL STRENGTHEN AMERICA'S CHANCE OF WINNING INTERNATIONAL AVIATION TROPHY

THAT an aerial "dark horse" in the shape of an aero-plane capable of a speed of 200 miles per hour and costing \$100,000 is being constructed to strengthen America's chances of winning the Gordon Bennett International Aviation Trophy this year was announced by the Aero

Club of America to-day.

This aerial "dark horse" is the entry of the Aero Club of Texas, which was the first of the forty clubs affiliated with the Aero Club of America to respond to the latter's invitation to participate in the international aerial contests to be held this year. The Aero Club of Illinois may also make

an entry. On learning that it is likely that unless we win the trophy this year, it will be lost to us forever, Mr. S. E. J. Cox, the president of the General Oil Company, of Houston, Texas, a member of the Board of Directors of the Aero Club of Texas, promptly offered to spend \$100,000 if necessary to "bring the Gordon Bennett to Texas." The entry was made by Mr. C. Anderson Wright, the president of the Aero Club of Texas, who arrived in New York with Mr. Cox a few days ago to consult with the Aero Club of America officials regarding the race. At a conference with Messrs. Alan R. Hawley and Henry Woodhouse of the Contest Committee of the Club, Mr. Cox stated: the president of the General Oil Company, of Houston, Texas,

Mr. Cox stated:

"We want to show that American aeronautic engineers can produce aircraft supreme to other countries. The best test of superiority in aircraft is speed and air worthiness, with the (Continued on page 703)

# CHANGES OF REGULATIONS FOR AIR RECORDS AND CONTESTS

HANGES of the international regulations regarding aerial record making and for contests for which \$2,000,000 in prizes are scheduled are announced by the Aero Club of America. These changes have been adopted by the eighteen countries represented in the International Aeronautic Federation, of which the Aero Club of America is the sole representative in the United States, and went into effect immediately. The changes modify the rules for tests for obtaining pilot certificates, as well as for making records of duration, distance, speed and altitude.

"Aviette" Records to Be Recognized

A new class of records of motorless aeroplanes or "aviettes"

A new class of records of motorless aeroplanes or "aviettes" has been created, but the Federation refused to create feminine records as a separate class, the refusal being based on the fact that women have been found to be as good aviators as men, therefore it is not necessary to create a separate class of records.

Flying Club Application Rejected

The Federation has rejected the application for affiliation of the American Flying Club and has notified the Flying Club that all communications to the Federation from the United States must be sent to the Aero Club of America, which has been the official representative of the Federation in the United States for fifteen years and is the only American organiza-tion recognized by the Federation.

The Federation has also denied the Flying Club the author-The Federation has also denied the Flying Club the authority to officiate at tests for records and has notified the national aero clubs of the eighteen countries affiliated with the Federation that the Flying Club is not and never has been recognized by the Federation and has not, and never had, authority to organize contests or officiate at the making of or homologate records. Pilots are forbidden from participating in any contest or event organized by the Flying Club. Any pilot who fails to obey these instructions will not be permitted to participate in contests held anywhere in the world under the rules of the Federation, and his records will not be recognized. will not be recognized.

Gordon Bennett Aviation Trophy and International Maritime Trophy Rules

The regulations for this year's contest for the Gordon Bennett Aviation Trophy provide for a race over a cross-country course of 300 kilometres, in a circuit of 100 kilometres. metres.

The race will take place in France at the end of September. The race for the Jacques Schneider International Maritime Trophy will take place at Venice, Italy, towards the end of August or early in September.

The proposal of the Royal Aero Club that machines should carry a useful load as ballast of 300 kilogs, was agreed to. The further proposal of the Royal Aero Club that the alightings on the water should form a qualifying test prior to the ings on the water should form a qualifying test prior to the race proper was also agreed to.

Rules for Aerial Derby Around the World and Atlantic Aerial Circuit to Be Submitted to National Aero Clubs of

Eighteen Countries.

The Aero Club of America submitted rules for the proposed Aerial Derby Around the World and the Aerial Circuit of the Atlantic. It was decided to defer consideration until the regulations, drawn up by the Aero Club of America, had been circulated to the national aero clubs of eighteen countries forming the Federation.

New Regulations for Records

The following are the aeroplane records recognized by the Federation Aeronautique Internationale:—
1. Duration. (Returning to point of departure without

alighting.)

(Distance. (Returning to point of departure without

alighting.)

The distance will be determined by the measurement of the arc of a great circle, taken at sea-level, which joins the vertical of the point of departure to that of the point of arrival.

3. Height. (Returning to point of departure without alighting.)

4. Speed records:-

(a) Speed over a given distance. Greatest speed, returning to point of departure, over:—
100 kilometres.
500 kilometres.

500 kilometres.

200 kilometres.
200 kilometres,
and then for every additional 500 kilometres.
(b) Greatest speed. Speed measured over a straight line course of 1 km., to be covered twice, once in each direction, in a single flight at a maximum height of about 50 metres. This must be the height of the machine 500 metres before entering the course. The greatest speed shall be determined by the average of the speeds without any correction.

The record for greatest speed must be beaten by at least 4 km, an hour.

hour.

The times must be taken in accordance with the instructions on the plan of the course. (See Figure.)

Speed Records-Plan of Course Distance over which the flight must be horizontal:-+ + + + + Distance timed from Post No. 1.

- - - Distance timed from Post No. 2.

The time +++++ less the time --- the average time of the double flight.

5. Records for useful load transported:
The records: 1, duration; 2, distance; and 3, height, may be established for useful load, in addition to the pilot:

250 kgs. of useful load.
500 " " " " 2000 " " " " " "

500 " " 1,000 " " 2,000

and then for every additional 1,000 kgs.

Control of Height Records

The height attained shall be determined by barometric pressure, converted into height from a standard table based on the following formula:—

$$z=5 (3064+1.73 P-O.0011 P^2) log \frac{760}{P}$$

This table must be used in all countries represented on the Federation Aeronautique Internationale.

The pressure readings shall be interpreted by a calibration of the instrument under an air pump at an official laboratory, under the responsibility of the Aero Club of America. A certificate of such calibration shall be attached to the papers of claim. The point of departure of the flight shall be 760 mm. pressure. The height attained shall be determined by means of the standard table, whatever the height of the point of departure and the pressure at this point at the time of the performance.

Note.—The height attained in the first attempts to beat the present records must be calculated as follows:—

1. In accordance with the method employed previously to establish the increment of 150 metres.

2. In accordance with the present regulations, which will give the figure to be assigned to the competitor.

Height records must be beaten by at least 100 metres.

World Records Resumed

World Records Resumed

World Records Resumed

The Italian representative reported that, although the freedom of the air had not been granted in Italy, they had accepted the invitation of the Federation to concur in the resumption of granting world's records. It was therefore decided to grant world's records as from January 6, 1920. Since then the decree forbidding civilian flying has been revoked.

New Rules for Aviators' Certificates

On the proposal of the Royal Aero Club, the tests for Pilots' Flying Certificates were amended as follows:—

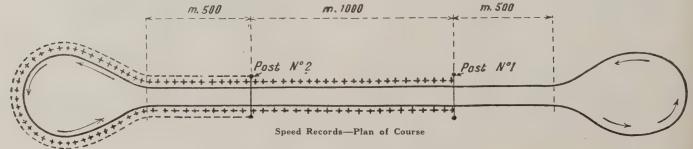
Test A—A flight without landing, during which the pilot shall remain for at least an hour at a minimum altitude of 8,000 metres above the point of departure. The descent shall finish with a glide, the engines cut off at 1,500 metres above the landing-ground. The landing shall be made within 150 metres or less of a point fixed beforehand by the official examiners of the test without starting the engine again.

Test B—A flight without landing around two posts (or buoys) situated 500 metres apart, making a series of five figure-of-eight turns, each turn reaching one of the two posts (or buoys). This flight shall be made at an altitude of not more than 200 metres above the ground (or water) without touching the ground (or water). The landing shall be effected by:—

(i.) Finally shutting off the engine or engines at latest when the aircraft touches the ground (or water).

(ii.) Finally shutting the aircraft within a distance of 50 metres from a point fixed by the candidate before starting.

The Aero Club of America, as the representative of the Federation Aeronautique Internationale in the United States, is prepared to observe attempts for records in the above categories. Applications should be addressed to Alan R. Hawley, Chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City, N. Y.





# THE NEWS OF THE WEEK



#### Navy to Build Giant Airship

WASHINGTON.-The largest dirigible in the world will be built by the United States Navy if Congress grants an appropriation of \$2,500,000 asked of the House Naval Committee by Capt. Thomas T. Craven, Director of Naval Aviation.

The proposed dreadnought of the air

The proposed dreadnought of the air will be 694 feet long, 50 feet longer than the airship being built for the United States Navy in Great Britain.

In urging the appropriation, Capt. Craven discussed the future of aerial warfare as a complement of fleet operations. The ship will carry more armament than any similar craft now in contemplation by any country. It will use helium, the non-inflammable gas.

The big ship now being built will be completed late this summer. Crews are being trained now to fly this ship across the Atlantic next fall. The larger ship will be built in this country after the other ship has arrived from England.

The Department hopes to continue nine naval air stations, including a new one at Hawaii. These will be at Chatham, Mass.; Rockaway Beach, L. I.; Cape May, N. J.; Anacosta, D. C.; Charleston, S. C.; Pensacola, Fla.; San Diego, Cal.; Panama and Hawaii.

#### Seattle Wants Municipal Aerodrome

A number of citizens of Seattle, Washington, are making a determined stand for a municipal landing field. They are urging for what, they can clearly see, will be to the future aeronautical advantage of their city and community.

#### Stehlin in Poland

A recent communication received from Capt. Joe C. Stehlin, who is rendering service against the Bolsheviki in Poland, indicates that he is well. "It feels fine to get down to real work again," he writes. "Little if any actual combat with Bolshevists; they are all practically German airmen."

# Aeroplane to Replace Torpedo Destroyers

CLEVELAND .-- A Martin aeroplane, designed to supplant the torpedo boat destroyers, received an official trial here recently and exceeded all requirements of the Navy Department.

The aeroplane carries a torpedo weigh-

The aeropiane carries a torped weighing approximately a ton and can be launched from aboard ship.

The machine had a speed of 114 miles an hour and climbed 4,000 feet in six minutes. Specifications call for 105 miles an hour and an ascension of 4,000 feet in ten

#### Air Travel De Luxe

The airship "R33" has been making a tour of the French battlefields. It carried a chef and gave its passengers French cooking, and real beds, with sheets. During a flight from Amsterdam to England, this lunch was served on a passenger aeroplane: Salmon mayonnaise, cold chicken, fruit salad and wine.

#### Canadian Aero Club Officers Elected

Toronto.—The Aero Club of Canada held its annual meeting in the club's quarters at 34 Yonge Street and transacted

considerable business in connection with considerable business in connection with the program for the year to promote aviation. An election of officers was held and the following members were placed in office: Col. W. J. Barker, V. C., honorary president; Col. A. K. Tylie, president; Major B. S. Wemp, D. F. C., first vice-president; Major A. M. Shook, vice-president for Ontario; A. F. Penton, honorary secretary: Capt. E. A. McKay. orary secretary; Capt. E. A. McKay, honorary treasurer. The following directors were elected: Capt. A. J. Hember, Capt. J. W. C. Clark, Major M. M. Sisley, Lieut. J. K. Shook and Lieutenant Purvis.

#### Flying Boats Shipped to San Diego

The U. S. S. Orion arrived at San Diego Tuesday with eleven F5L type flying boats for the Pacific Fleet Air Detachment at North Island The seaplanes will be used to maintain the regular daily air mail service between the island and San Pedro in Los Angeles harbor. Additional ships are understood to be en route by rail, arrival of which will greatly increase activity at the naval air station.

#### Aerial Film Very Successful

The motion picture "The Great Air Robbery," which was put on the screen by the Universal Film Manufacturing Co., featuring Ormes Locklear and Curtiss J-N's in a story of the aerial mail, has achieved remarkable success.

#### Planes to Spot Seals

Washington.-Aeroplanes will be used on the coast of Newfoundland and east-ern Canada for the purpose of locating seal herds, according to a report received by the Bureau of Foreign and Domestic Commerce. The undertaking is thought to be feasible and it is predicted will prove

#### Major Pollock in Paris

Granville A. Pollock of New York city, formerly a member of the Lafayette squadron, has arrived in Paris on an in-

vestigating mission for the New York aerial police. He intends to study the laws governing international air communications and see whether there is anything in them which can be applied profitably in America. He intends to fly

profitably in America. He intends to fly to Spain and Portugal.

"While European cities have not yet established aerial police forces such as we have in New York city," he said, "they have developed commercial transportation in an admirable way. Air lanes have been established between Paris and London, Paris and Brussels and Madrid and Lisbon, and the authorities have regulated many things, such as aerial customs duties, frontier crossings and landing restrictions, which we can study with profit. strictions, which we can study with profit.

"Our volunteer air force in New is a novelty as yet, but it is bound to ex-Already we perform useful services in relieving port congestion and preventing lawless exploitation of the air. The city of New York can afford to send some of us abroad to investigate European conditions, for we are a volunteer organization and draw no salaries. Aeroplane traffic is going to increase in the immediate future, and it is for that we are preparing.

#### Aerial Taxis for London Strike

LONDON.-While taxicab drivers indulge in a twenty-four-hour strike to enforce their demand for an increase in their schedule of fares an enterprising aircraft company has launched a scheme for aerial taxis.

For a fare of fifty cents a mile two passengers will be carried at a speed of one hundred miles an hour, piloted by a skillful aviator, in an aeroplane which provides a place for carrying light luggage. It now is possibble to travel in this way from London to the south of France

By the use of the aerial taxi, an American business man claims to have closed a \$15,000 deal which he otherwise would have failed to get.



Winter sports at Toronto. Ice boats and one of the Canadian training planes of the Ericson Aeroplane Company, equipped with special landing skids

Aero Club at LaCrosse, Wis.

An aero club has been established at LaCrosse, Wisconsin, and the members have located the site for an excellent landing field, which is expected to be ready with hangars this spring.

The field has been judged by Mr. Alfred W. Lawson, creator of the Lawson Air Liner, as a very satisfactory one, and Mr. Lawson will use it as one of the main landing fields on the coast-to-coast route over which his aeroplanes will fly. over which his aeroplanes will fly.

Personal Paragraphs

John J. Eyre has become designing engineer with the Simplex Wire and Cable Company, Cambridge, Mass. He was until recently connected with the Sturtevant Aeroplane Company, Boston, Mass. in the capacity of factory engineer. Mass., in the capacity of factory engineer.

Prof. George W. Lewis, formerly general manager Clarke Thomson Research, Philadelphia, has been appointed executive officer National Advisory Committee for Aeronautics.

Arthur E. Allen, who was manager of the supply division Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa., before the war, in which he was with the Canadian overseas force, and later second lieutenant with the Royal Flying Corps, has been appointed district manager at New York for the Westinghouse company. He succeeds E. D. Milburn, promoted to vicepresident of one of the allied companies.

To Dispose of Hangars

The Material Disposal and Salvage Division of the Supply Group have a number of hangars and frames for sale. Approx. Price items are as follows: 171 Alban Richards type A

aeroplane hangars.....\$6,000 \$2,000 Size 72 ft. x 41 ft., front 72 ft.

High (front) 15 ft. High (ridge) 23 ft. 9 in.

High (rear) 8 ft. 6 in. Depth 40 ft. Includes frame and can-

vas cover.

Virginia.

If any further information is desired a

letter should be addressed to the Material Disposal and Salvage Division of the Supply Group, Washington, D. C.

Pacific Airport at San Francisco

San Francisco has saved a great aviation field for itself, when the Exposition Marina was leased to make it available as the great central airport of the Pacific Coast. The transcontinental Aerial Mail it is expected, will be extended to San Francisco this spring, or early in the summer.

The land is leased to the city for a year, subject to renewal on a new basis next The building of the hangars and the general conversion of the grounds into a good landing field will be the obligation of

the government.

Recently a meeting was called in San Francisco of all those interested in flying; the purpose being to point out the necesof doing something to keep the city in line with aerial progress. Mayor Rolph has appointed excellent aviation authorities members of the San Francisco Airport committee. Plans have been made making San Francisco the airport of the Pacific, and work has started on clearing the ground in preparation for receiving the Lawson Airliner. The airport will upon completion receive aeroplanes, hydroaeroplanes or seaplanes and also dirigible airships.

Following are the members of Mayor

Rolph's airport committee:

Supervisor John C. Kortick, chairman; Colonel H. H. Arnold, commanding Western Department Army Air Service; George C. Boardman, vice-president of the Chamber of Commerce; Sidney S. Bibbero, Pacific Aero Club, 915 Monadnock bero, Pacific Aero Club, 915 Monadnock building; William F. Benedict, Mayor's secretary; Perry L. Cumberson, Rotary Club; Frank E. Carroll, 57 Post street; R. A. Crothers, The Bulletin; Supervisor Cornelius Deasy; Frank De Lisle, 240 Montgomery street; George W. Gerhard, Civic League of Improvement Clubs; Supervisor Andrew I. Gallagher; R. B. Supervisor Andrew J. Gallagher; R. B. Hale, representing Pacific Exposition; Supervisor Oscar Hocks; William L. Hale, representing Facility Supervisor Oscar Hocks; William L. Hughson, 1101 Van Ness avenue; Rear Admiral J. L. Jayne, commanding Twelfth Naval District; Supervisor Ralph McLeran; Eugene McLean; Louis Mooser, First National Bank; Joseph Mulvihill,

president Board of Supervisors; Miss Margaret McGovern; Frank C. MacDonald, San Francisco Building Trades Council; John F. Neylan; Charles A. Nelson, City Hall; John A. O'Connell, San Francisco Trades Council; William T. Porter, San Francisco Ad Club; Major Loring Pickering, representing San Francisco flying men; Supervisor Richard J. Welch; Supervisor Edward I. Wolfe, and John P. Young, the Chronicle.

#### To Promote Power Boat Racing and Aviation in Canada

Representatives of 150 yachting clubs of the Middle West and Canada have completed organization of the International Power Boat Union, the purpose of which, it was announced, would be to "promote the sport of power boat racing, to unify racing rules and authorize dates for the territory it embraces."

Any group of three or more yacht clubs will be admitted to the union and each such organization will be represented on

the board of governors.

The principal organizations in the union are the Mississippi Valley Power Boat Association, Michigan Yachting Association and the Detroit River Yachting Association. Canadian and Lake Ontario

officers include: President, Charles P. Hanley, Muscatine, Iowa; Vice-President, F. G. Ericson, Toronto; Secretary, Robert E. Power, Cleveland; Treasurer, Sheldon

Clark, Chicago.

#### Complete Practical Machinist

This new book published by Henry Carey Baird & Co., Inc., containing 547 pages and 432 illustrations, is a volume which should be in the hands of every machinist. Joshua Rose, M. E., the author, has written a number of books on similar subjects and is competent to deal with the situation thoroughly. The book includes a discussion of lathe work, vise and bench work, drills and drilling, taps and dies, hardening and tempering, making and use of tools, tool grinding, marking out work, lathe attachments and their uses, machine tools, etc. The book is procurable through The Aeronautic Li-brary, 299 Madison Avenue, New York, brary, 299 Madison for \$3.30 postpaid.



The Pony Blimp manufactured by the Goodyear Tire & Rubber Co. and named by Major Charles J. Glidden, vice-president Aerial League of America, which will be seen for the first time in the East at the New York Aero Show, March 6-13



Major John Inwood, late of the Royal Air Force, has been elected Secretary-Treasurer of the Interallied Aircraft Corporation, and has also been appointed manager of the company, succeeding C. H. Payne, formerly Managing Director, and J. W. M. Richardson, formerly treasurer, resigned.

Major Inwood served with the Royal Air Force in England, France and Canada since 1916, and was in charge of the organization and operating and equipment branch in Toronto from its inception until last July when the affairs of the Force were wound up.

Major Inwood has not only had broad experience in flying, but also in the business of aeronautics, for his duties in the operating and equipment departments called for the organization of stores, the supervision of repairs and the purchase of supplies involving the expenditure of \$40,-000,000 during the 19 months he was in charge. He is also widely experienced in charge. He is also widely experienced in banking. Major Inwood is not a stranger to the United States for he lived for a considerable time in California.

Lieut. Col. W. A. Bishop, V. C., etc., who continues as president of the Interallied Aircraft Corporation, will devote a great deal more of his time than hearts.

great deal more of his time than heretofore to its affairs, which may also be said of Lieut. Col. W. G. Barker, V. C., etc., vice-president. The corporation will engage in the aircraft industry on a larger scale than formerly, and is selling in the United States the famous Avro machine.

#### Green Bay Company Organized

The Green Bay Aero Club, of Green Bay, Wisconsin, has been organized as a distributing, exhibition, and passenger service company. The company has a landing field of about 200 acres, and a full service station is maintained. A particularly cordial invitation is extended to visiting fliers to use the field.

The officers of the company are as

follows

President, Clarence A. Gross; Vice-President, Andrew B. Turnbull; Secretary, Carl E. Dreutzer; Treasurer, Perrv S. Wagner; Manager, Eugene K. Wagner; Publicity Manager, Donald M. Murphy; Pilot, F. F. Manor.

#### New Texas Company

The Panhandle Aerial Service Transportation Company has been chartered in the state of Texas, with its principal office at Amarillo, Texas. The company has an aerodrome of over 300 acres adjoining the city of Amarillo and hangar space for visiting planes. The company was organized for the purpose of developing commercial aviation and they now

have a number of ships in operation.
Mr. W. K. Whipple, General Manager of the company, states that it is their intention to establish two long cross country routes, using large passenger carrying ships.

Amarillo, Texas, is a very convenient point for cross country fliers to rest and they are sure of a cordial welcome and

Major Inwood Now Manager of Interal-lied Aircraft Corporation can obtain expert service. A large stock of repair parts are carried for Curtiss motors and ships.

#### At the New York Show

The man who intends to spend a few thousand dollars for the newest vehicle in the world's commerce—aircraft—will undoubtedly find just what he wants at the annual aeronautical exposition which the Manufacturers Aircraft Association will hold at the Seventy-first Regiment Armory in New York, March 6 to 13th.

Among the twenty or more aeroplanes and lighter-than-air craft to be exhibited, are several surprises—recently developed planes new to both flying man and layman. They will be lower in cost, far more comfortable and easier to operate this year than were the war machines ex-

hibited at last year's show.

hibited at last year's show.

The exhibits range throughout the industry. The L. W. F. Engineering Corporation has entered its two vastly different machines. The L. W. F. Cato "Butterfly" is a monoplane weighing less than 500 pounds and designed to sell within the \$2500 mark. The huge L. W. F. freighter will carry from 3000 to 6000 pounds cargo. It is designed for the transcontinental mail route. The freighter has a wing span of 106 feet from tin to has a wing span of 106 feet from tip to tip, while the "Butterfly" is diminutive in size and appearance.

The Curtiss Aeroplane & Motor Corporation will show a new Eagle—the multimotored aerial pullman, capable of carrying from eight to ten passengers; also Orioles-the swift overland machines equipped with new style cockpits and possessing more room for passengers than

the first type Orioles.

Aeromarine flying boats fitted with leather upholstered tonneaus, where the passengers sit in comfort in the rear of

the pilot with cigar lighters and vanity cases at their disposal will be shown by the Aeromarine Plane & Motor Corpora-

The Thomas-Morse transcontinental air mail plane is being given its initial flights at Ithaca, N. Y., preparatory to being at Ithaca, N. Y., preparatory to being entered in the show. It is unique in design and construction. Its two 300 horse power Hispano-Suiza engines will carry it with pilot and mechanic and 1,500 pounds of mail for 500 or 600 miles without stopping and at a speed of 135 miles an hour

The plane has wing span of only  $45\frac{1}{2}$  feet and its two bodies are each 35 feet long. The motors are both in the nacelle,

one in the nose, the other in the rear.

The Glenn L. Martin Company will show one of its big aerial transports of the type that has had marked success on

the New York to Chicago mail route.

The Dayton Wright Airplane Company have entered the O. W. aerial coupe and the K. T. cabin cruiser. The coupe is equipped with an eight cylinder Hispano-Suiza motor and is designed to be to the air what the luxuriously finished limouring is to the booleants. sine is to the boulevard—a comfortable, serviceable adornment. It has great supporting surfaces and seats three passengers in comfortable upholstered chairs. The K. T. is equipped with a Liberty twelve.

Lighter than air craft will be sented by the Goodyear Tire and Rubber Company, Pony Blimp, a two man capacity, non-rigid dirigible with a cruising radius of 400 miles and a speed of forty

miles an hour.

Accessory manufacturers will show a complete assortment of the products they have originated and perfected during the year looking toward the refinement and the improvement, from a commercial standpoint, of all aircraft.



Major John Inwood, general manager; W. A. Bishop, president; and W. G. Barker, vice-president, of the Interallied Aircraft Corporation

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
Leon B. Lent, Assistant to the Second Assistant Postmaster General
in Charge of Aeronautics
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying
John A. Jordan, Chief of Construction
George L. Conner, Chief Clerk, Aerial Mail Service
John A. Willoughby, Operator in Charge Radio Experiments
Eugene Sibley, Operator in Charge Radio Maintenance and Operation



**PILOTS** 

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellis
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I. Stanton, Superintendent New York-Washington Division
George O. Noville, Superintendent New York-Cleveland Division
Edward McGrath, Superintendent Cleveland-Chicago Division
William J. McCandless, Superintendent Chicago-Omaha Division
Harry L. Hartung, Manager, Heller Field, Newark
Herbert Blakeslee, Manager, Bustleton
Eugene W. Majors, Manager, College Park
Andrew R. Dunphy, Manager, Chicago
Maurice J. Kelly, Manager, Bellefonte
Victor W. Fitch, Manager, Newark Warehouse

Samuel C, Eaton
Frederick A. Robinson
Elmer G, Leonhardt
Walter J. Smith
Paul W. Smith
Farr Nutter
Wesley L. Smith
Joseph P. Harris
Clayton W. Stoner
Mark C. Hogue

in Senate

Washington.—Retention of the aeroplane mail service, for which the House refused to provide funds, was urged be-

\$3,400,000 for Aeroplane Mails Urged Second Assistant Postmaster General and Minneapolis. He also asked other Praeger. He asked that \$3,400,000 be provided for service on routes from New York, Chicago, San Francisco, Pittsburgh, Kansas City, Detroit, Washington, Clevefore the Senate Postoffice Committee by land, Toledo, St. Louis, Atlanta, St. Paul

funds for private aeroplane mail contracts on branch routes.

Stating that the aerial service expedites mail to Chicago by sixteen hours and to San Francisco by twenty-four hours, (Continued on page 706)

#### UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—NEW YORK-CHICAGO ROUTE Monthly Report of Operation and Maintenance DECEMBER, 1919

	1		<b>E</b>	1	uel.		1	70			_			SER	VIC	E ANI	UNIT	COST	
Aeropiane No.	Gasoline	Grease and Oil	Office Force and Watchmen	Motorcycles, Trucks	Rent, Light, Fuel. Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	Gallon of Gasoline	Total Time	Kun	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
344 39A 46 60 65 66 67 77 77 81 85 88° 91 92 94 95 98 99 101 102 103 104 105 106 107 108 201 204 242 244 242 275 Total	\$117.48 10.50 75.60 49.45 75.46 28.00 20.16 212.96 358.17 311.60  68.75 301.42 60.10  47.60 173.73 310.70 146.48 215.30 308.33 181.83 53.48 9.80 32.20 2.80 12.07 \$3,183.97	\$11.11 .49 .29.70 7.65 .15.85 .75 .36.90 .53.55 .39.34         	\$86. 09 86. 10 86. 10 86. 10 86. 10 86. 10 86. 10 86. 10	\$26.90 26.90	\$21,33 21,34 21,34	\$60. 97 60. 97 6	\$105.47 104.57 115.04 37.20 24.38 305.21 439.94 343.68 113.78 350.91 45.15 77.28 150.62 271.80 117.75 336.82 333.21 185.84 37.93 19.12 15.13 \$3.530.83	\$132, 28 25, 99 87, 61 23, 46 55, 71 100, 67 80, 00 250, 85 93, 53 186, 66 190, 67 22, 73 14, 88 50, 08 15, 88 50, 08 120, 30 63, 01 103, 63 120, 73 46, 18 190, 67 210, 52 176, 88 190, 17 210, 52 176, 88 190, 11 4, 00 9, 00 9, 00 9, 00 9, 00 9, 00 9, 00 9, 00 9, 23, 22, 43	\$78.40 15.35 222.50 31.00 41.90 234.61 23.21 159.05 52.77 302.00 1.250.75* 22.30 68.50 33.41 22.00 68.45 92.09 38.30 8.25 5.40 14.80 15.60 \$2.800.64	\$72.50 37.50 41.43 50.00	\$65.08 65.09	\$777. 61 334. 85 614. 64 333. 84 760. 73 570. 56 461. 03 843. 84 1,507. 75 1,248. 44 333. 11 325. 26 326. 26 551. 59 1,485. 92 1,895. 43 325. 46 440. 68 373. 39 569. 30 842. 03 356. 57 1,172. 58 1,172. 58 1,172. 58 1,172. 58 1,172. 59 1,283. 50 569. 96 484. 61 553. 26 347. 22 \$23,837. 83	421 35 270 175 259 100 721 1,244 1,085 1,059 205 	9 10 3 2 2 8 40 31  7 13 225 10 31 31 32 4  17 13 17 31 17 31 17 31 17 31 17 31 17 31 31 31 31 31 31 31 31 31 31 31 31 31	44 39 37 26 15 10 36 43 10 08 54 08 54 09 30 47 25	910 980 980 475 200 2,581 3,660 411 445 1,288 2,451 1,021 2,961 2,856 2,171 2,171 2,171 2,171 2,171 2,171 3,	2.2 3.0 5.6 1.8 2.8 3.5 2.9 2.0 2.6 2.1 2.2 2.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4	\$79.86 63.60 71.58 166.14 375.06 35.04 37.14 39.36 52.56 45.90 45.48 	\$0.85 .77 .78 1.20 4.22 .38 .41 .42 .55 .48 4.61       
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Cost per mile, overhead, \$.28; cost per mile, flying, \$.23; cost per mile, maintenance, \$.27.

Note. Planes Nos. 34 to 46, inclusive (except 39-A), Curtiss R4, equipped with Liberty-12 motors.

Planes Nos. 50 to 108, inclusive, and 24227, De Haviland, equipped with Liberty-12 motors.

Planes Nos. 201 to 204, inclusive, Martins, equipped with two Liberty-12 motors.

Plane Nos. 201 to 204, inclusive, Martins, equipped with two Liberty-12 motors.

Plane Nos. 44305, Curtiss JN4D, equipped with Curtiss OX-5 motor.

†Includes part of cost of moving station from Belmont, N. Y., to Newark, N. J

OTTO PRAEGER, Second Assistant Postmaster General.

# EFFECT OF TEMPERATURE AND PRESSURE ON THE SPARKING<sup>1</sup> VOLTAGE

By L. B. LOEB and F. B. SILSBEE

#### Résumé

HE investigation described in this report was conducted at the Bureau of Standards for the National Advisory Committee for Aeronautics.

The spark discharge used to fire an internal combustion engine must pass through the compressed and heated mixture which occupies the engine cylinder near the end of the compression stroke. The object of the experiments described in this report was to determine how the voltage necessary to produce such a spark discharge varies with the pressure and temperature of the gas. The results are of value in showing what voltage an ignition system is required to deliver in order to produce a spark and in enabling one to set up in the labora-tory a convenient experimental gap electrically equivalent to that in the engine cylinder.

Measurements were made on spark plugs screwed into a bomb containing compressed air, and inserted in an electric furnace so that both pressure and temperature could be varied as desired. The sparking voltages were measured

as desired. The sparking voltages were measured on four plugs, having different electrodes, at pressures up to 100 pounds per square inch and temperatures up to 550° C. Both 60-cycle alternating current and current obtained from a magneto were used. The observed voltages are plotted against pressure in plots 2, 3, 4, and 7, and against density in plot 5.

The results show that the sparking voltage is a linear function of the destiny of the gas and depends upon pressure and temperature only as they affect the density, i. e., heating a gas at constant volume does not affect the sparking voltage. For a typical spark plug gap set at 0.5 mm. (0.020 inch) the sparking voltage was found to be 2.800 volts at atmospheric density ing voltage was found to be 2,800 volts at atmospheric density and 9,400 volts at a density five times as great.

The data given in this report were obtained on air only. The results of measurements made elsewhere indicate that the sparking voltage in an explosive mixture of gasoline and air is about 10 per cent less than in pure air, and that the change in voltage is proportional to the amount of gasoline

present.

#### Introduction

This report describes some experiments made to determine the change of spark potential with pressure and temperature in order to determine the necessary minimum potential for

<sup>1</sup>This Report was confidentially circulated during the war as Bureau of Standards Aeronautic Power Plants Report No. 14.

causing sparks to pass in a gasoline engine whose compression ratio was known and in which the temperature of the gases before ignition could be estimated.

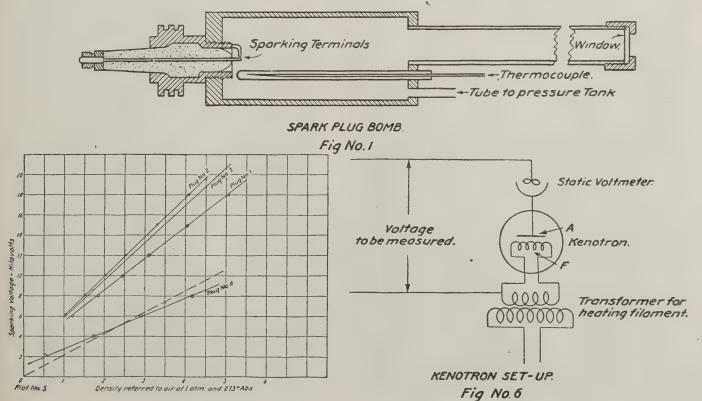
According to the simple theory (J. J. Thomson, Conduction of Electricity through Gases; Townsend, Electricity in Gases; and Peek, Transactions of the American Institute of Electrical Engineers, 1910–1916) the sparking potential depends solely on the density of the gas between the electrodes for a given fixed pair of electrodes. fixed pair of electrodes, i. e., on the total number of molecules between the electrodes. This has been investigated over a considerable range of pressures, spark distances and forms of electrodes by numerous observers, but only three investigators have studied the effect of temperature, and then only over a limited range. They all found that the sparking potential depended solely on the density of the gas over the range

In the study of aeroplane spark plugs it seemed advisable to determine whether this law held for pressures and temperatures which might occur in the cylinders of a high compression engine just before the ignition of the charge. In aeroplane engines the maximum compression pressures under normal conditions range from 90 to 130 pounds per square inch with temperatures up to 300° C.

#### Apparatus

The experiments were conducted as follows: An ordinary %-inch Titan A. C. porcelain plug was screwed into a steel bomb about 25 cm. (10 inches) long, having the design indicated in figure 1. There was a thick glass window opposite the sparking terminals when the plug was screwed in position. A high-pressure air tank connected to the bomb through suitable valves served to regulate the air pressure to any desired value. Temperatures were measured by a Pt, Pt-Rh thermocouple, B. S. W5, which was inserted in a steel tube sealed at one end with walls ½ mm. (0.020 inch) thick. This was screwed in to the bomb so that its inner end was within 1 cm. of the sparking terminals of the plug. The bomb was placed in a cylindrical electric resistance furnace and packed with asbestos wool, so that only the porcelain insulator was exposed at one end, while the window projected out about 5cm. (2 inches) beyond the other end.

Sixty-cycle voltage was supplied through a step-up transformer having a ratio of 200:1 and applied between the central



electrode and the bomb. A resistance of 220,000 ohms was put in series with the plug to avoid an excessive current and consequent burning of the terminals when the spark passed. The voltage was read on a voltmeter connected to the low-tension side of an auxiliary step-down transformer. The passage of the spark was made evident both by the kick of the voltmeter and by the appearance of the spark in the bomb. Ionization was provided for by the use of a half milligram sample of radium in most of the experiments, while in some a 50-mgm. sample, placed just below the electric furnace, was also used. This ionization served to eliminate the complicating effect of spark "lag" and made the readings much more consistent and reliable. No striking difference in the readings could be noticed with the two different samples.

The tests were run on three Titan plugs: No. 1 had the regular terminals of Ni-Mn wire 1.3 mm. (0.051 inch) in diameter set at right angles and separated by 1.8 mm. (0.071 inch); No. 2 was a Titan plug with similar terminals 3.13 mm. (0.123 inch) in diameter rounded at the ends, separated by 1.2 mm. (0.047 inch); No. 3 was a plug like No. 1 but with a distance of 2.2 mm. (0.086 inch) between the wires. In each case the spark passed between the cylindrical surfaces of the wires near the point of closest proximity.

#### Procedure

The readings were taken as follows: The temperature was run up to the desired value and held constant from 15 minutes to half an hour. There were fluctuations at the higher temperatures of as much as 10 degrees either way so that a mean temperature was chosen as representing the true conditions. The breakdown voltage of the gap was then determined by at least 10 trials for each pressure. The pressure was increased in steps of 10 pounds per square inch. The pressures were read by two small pressure gauges whose ranges were from 0 to 100 pounds per square inch. The spark potentials were read to as high a pressure as it was possible to obtain without the sparks passing over the outside of the insulator. Then the pressure was reduced in steps of 20 pounds and read-

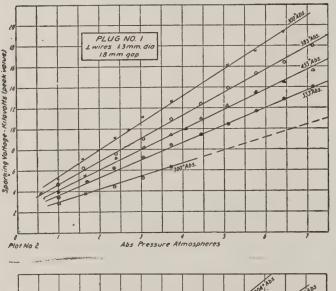
ings again made. As a whole the return readings checked the first readings well. This can be seen from the plots where maximum sparking voltage is plotted against the pressure for each temperature. As the voltage which could be used without sparking over the outside of the porcelain was about 19,000 volts, no voltages were measured above this. The pressure range over which the measurements could be carried out started from 60 pounds at room toemperature and increased until at 200° C., or thereabouts, pressures of 100 pounds could be used.

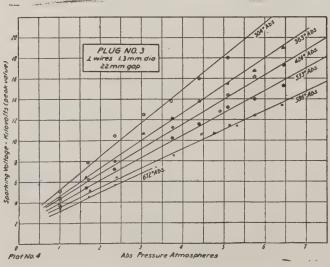
From then on the pressures were limited with increasing temperatures by a new phenomenon which may have been caused by electron emission from the hot terminals at high voltage. Under these conditions the spark was replaced by a sort of purple brush discharge (corona) which came on gradually as the voltage was increased.

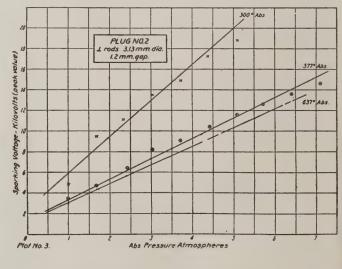
It was at first thought that this glow discharge might be an important factor in causing ignition trouble. Further measurements were therefore made in the same apparatus but with a Bosch D-6 magneto as a source of voltage. With this arrangement no brush discharge could be detected although the observations were carried to 760° C. Above 600° C. the electrical conductivity of the porcelain insulator was great enough to prevent the magneto from sparking at the higher pressures, but there was no sign of brush discharge under any conditions. It is probable that a certain time is required for such a discharge to form and that the very sudden application of voltage produced by the magneto does not admit of this.

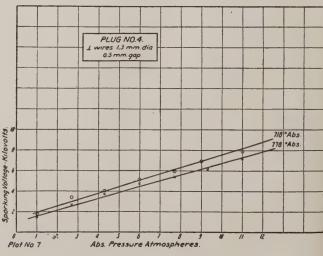
#### Results

The curves plotted between maximum sparking potentials in kilovolts and pressure in atmospheres may be seen in plots 2, 3 and 4. The results represented by all these curves, except the one for low temperature measurement with the larger terminals could be repeated consistently. It is possible that a stronger source of ionization should have been provided, and the voltage increased still more slowly in this case. The slight curvatures of the lines may be due in part to the gauges,









since no calibration corrections were applied. The direction of the curvature is the same as that noted by other observers.

The data given in the curves were analyzed by first reading from each of the curves the pressure corresponding to a given voltage, say 10,000 volts. From this pressure and the temperature pertaining to the cure, the relative density of the gas is then computed by the formula:

$$\rho = \frac{\delta}{\delta_o} = 273 \frac{P}{T}$$

where  $\delta_0$  is the density at 1 atmosphere and 273° absolute, P is the pressure in atmospheres, and T the absolute temperature in degrees centigrade. This was done for six different voltages on each plug. Table I gives the results on plug No. 1 at 10,000 and 8,000 volts, and is typical of the other data. It is evident that the densities thus obtained are constant within a few per cent over the entire range and show no systematic change with temperature or pressures.

TABLE I.

	Density at			
Temperature Abs.	10,000 volts	8,000 volts		
300°	2.51	. 1.83		
83°	2.46	1.80		
15.3	2.38	1.78		
700°	2.59	1.96		
Mean	2.45	1.83		

It may therefore be concluded that the breakdown voltage is a function of the gas density only. To determine the form of this function the average values of density obtained as described above are plotted against the corresponding voltage in plot 5. The curves thus obtained show that the breakdown voltage is a linear function of the density but is not proportional to it. The data can be represented by the following equations:

Plug No. 1  $E = 2.2 + 3.1 \rho$  $E = 1.8 + 4.0 \rho$ Plug No. 2  $E = 2.4 + 3.4 \rho$ 

Where E is the sparking voltage in kilovolts and  $\rho$  is the density relative to air at atmospheric pressure and 0° C. The constants in these equations are of course dependent upon the shape and spacing of the electrodes, and would be smaller for the case of the shorter 0.5 mm. (0.020 inch) gaps used in spark plugs.

In addition to the measurements with alternating current descirbed above, a second seres of tests was made, using a Bosch D-6 magneto as the source of e. m. f. and a special crest voltmeter equipment1 to measure the breakdown voltage.

This equipment consisted of an Albrecht electrostatic voltmeter connected in series with a G. E. kenotron (electric valve) as shown in figure 6. This valve permits current to flow when the heated filament F is negative with respect to the relatively cold anode A, but allows no current to flow in the reverse direction. Consequently, a negative charge accumulates on the insulated conductor, formed by the anode and the case of the electrometer, of such amount that when the sparking electrode and voltmeter needle are at their greatest positive potential the filament and anode are at the same potential, and there is no tendency for further charging. During the rest of the time the needle of the voltmeter is near ground potential, but the rectifying effect of the kenotron prevents the charge from leaking off. Consequently the meter comes to a steady deflection which measures the maximum positive voltage applied.

Runs were made with this apparatus at temperatures of 460° C. and 520° C. up to pressures of 150 pounds per square inch, using a Champion (Toledo) plug No. 4 with X-bend electrodes set with the usual spacing of 0.5 mm. (0.020 inch). The results as obtained are plotted in plot 7 and the combined data from these curves are plotted against relative density in plot 5, giving a line whose equation is

$$E = 1.1 + 1.7 \rho$$
.

These measurements with the magneto and crest voltmeter showed the presence of a further complication due to the fact that the heat of the spark raised the temperature of the electrodes very materially. This in turn heated the gas near them so that the discharge occurred through gas which was decidedly less dense than the surrounding atmosphere. This was indicated by the fact that at first starting the magneto the voltmeter showed a relatively high voltage (in one case 4,100 volts), which decreased gradually for nearly a minute, after which it remained constant at a much lower value (2,350 volts). The time required for the change implies very strongly that it is a purely thermal effect rather than any ionization due to the preceding sparks, since the latter effect would be almost instantaneous. In the case of a spark plug in an engine cylinder, the central electrode, being insulated thermally as well as electrically by the core, is much hotter than the incoming charge and consequently this effect may be present to some

As a check upon the laboratory data measurements were also made in a Hall-Scott A-5 aviation engine having a compression ratio of 4.2:1. Owing to the late closing of the intake valve and the advance of the spark, the actual ratio of cylinder volume at intake to that at ignition was only 3.2:1. If it can be assumed that the charge in the cylinder is at atmospheric pressure and temperature at the closing of the intake valve, then the relative density at ignition will be 3.2. Plug No. 4 was run in this engine firing from a Dixic "48" magneto. The crest voltage as measured by the kenotron was found to be 5,950 volts. Measurements with a calibrated spark gap having 1 cm. spheres indicated 4,500 volts. The voltage predicted for this density from figure 5 is 6,400 volts.

In comparing these results it must be borne in mind that the crest voltmeter loses its charge very slowly, so that it really indicates the highest peak occurring during two or three minutes preceding the reading. The parallel spark gap, on the other hand, is adjusted to fire about half the time and probably gives more nearly the average crest voltage. It appears, therefore, that the results obtained in the laboratory are in substantial agreement with those found on the engine, and that the linear relation between voltage and density may be safely applied to ignition circuits.

applied to ignition circuits.

It will be noted that the results shown in plot 5 can be represented roughly by a straight line through the origin, such as is shown dotted, and which indicates a direct proportionality between the sparking voltage and density. relation will be found useful in cases where the voltage is known at some one density and it is desired to estimate it for another density not too widely different. It is unsafe, however, to use this law of direct proportionality to extrapolate over a long range from the sparking voltage at normal atmospheric density to that at a very high density.

#### Conclusions

These experiments confirm the relation that the breakdown voltage of a spark gap depends only upon the density of the gas and varies with pressure and temperature only as they affect the density. This relation is found to be valid up to 800° C. and 8 atmospheres pressure. Both the pressure and temperature of the charge in a gasoline engine increase very greatly during the compression stroke, but the sparking voltage can be computed from the linear relations shown in plot 5 without a knowledge of these variables separately, since the density is determined solely by the original density and the compression ratio. For small changes in density, as between engines of different compression ratios, the assumption that the voltage is proportional to the density may be made.

With the sudden discharge from an ignition coil or magneto disruptive spark is produced even at temperatures where a

60-cycle voltage would produce a brush discharge.

The voltage required for a spark plug set at 0.5 mm. (0.020) inch) in an aviation engine of moderate compression is of the

order of magnitude of 6,000 volts.

<sup>&</sup>lt;sup>1</sup>Sharp, C. H., Electrical World, 69, p. 556, 1917.



# THE SOPWITH AUSTRALIA TRANSPORT BIPLANE

HE Sopwith Australian transport is not unlike the Sop-

THE Sopwith Australian transport is not unlike the Sopwith transatlantic in general outline.

Being designed for such a long journey, one of the first considerations, next to aerodynamical efficiency, has naturally been the provision of the maximum of comfort for the occupants. As will be seen from the accompanying illustrations, the machine has a very deep fuselage, forming an enclosed cabin for the pilot and engineer. Inside this cabin are ararnged the two seats, that of the pilot-navigator being in front. These seats are mounted on a tubular framework which can be raised and lowered, running on vertical tubular which can be raised and lowered, running on vertical tubular guides, and locked in any desired position. If, therefore, the pilot wishes to be absolutely protected from the weather he lowers his seat and draws the sliding panel in the roof of the cabin over the circular cockpit, when he is as comfortable as possible, out of the draught and noise. Just before landing, or if, for any reason, during the voyage he wishes to obtain a better view than that afforded from inside the cabin, it is a matter of a few seconds only to slide the the cabin, it is a matter of a few seconds only to slide the

the cabin, it is a matter of a few seconds only to slide the panel forward, raise the seat, and he is then in the same position, relatively to the *fuselage* and wings, as in an open machine. The rear cockpit is similarly arranged.

All the controls are in duplicate, the "stick" being a tube which slips into the socket on the control shaft. At a moment's notice, therefore, either of the occupants can take over the control of the machine, the other withdrawing his "stick" and placing it on the side of the *fuselage*, where suitable clips are provided. An interesting feature of the pilot's controls is that the rudder bar is in duplicate, one bar being placed low near the floor the other higher up to correspond with the highest position of the seat. In this manner no matter at what height the seat is placed, one foot bar is in a comfortable position, and as a matter of fact even with the seat at its highest position the lower foot bar is within reach, seat at its highest position the lower foot bar is within reach,

thus allowing the pilot to stretch his legs without taking his

feet off the rudder control. For a flight of the duration of that contemplated, this is a point that deserves consideration. As the *fuselage* is of considerable cross section, the instruments carried occupy only a small portion of the dash in front of the pilot. The space thus left is utilized by providing a locker, holding two ply-wood trays to which are pinned the maps of the country over which the machine is passing. Fixed to these trays with small metal clips are parallel rulers dividers etc. so that the pilot who incidenparallel rulers, dividers, etc., so that the pilot, who incidentally is also the navigator, has at his finger tips all the instruments required for working out his course. When not in use these maps are pushed into the locker and the door

Triplex windows are provided in the sides of the *fuselage*, and a small window is also fitted in the floor in front of the pilot. The latter window is ruled with a set of lines, one running parallel with the longitudinal axis of the machine, and others forming various angles with it. By watching through this window the path traced out by objects on the ground the pilot can get a very good indication of the drift ground the pilot can get a very good indication of the drift—that is to say, the angle between the course steered and the

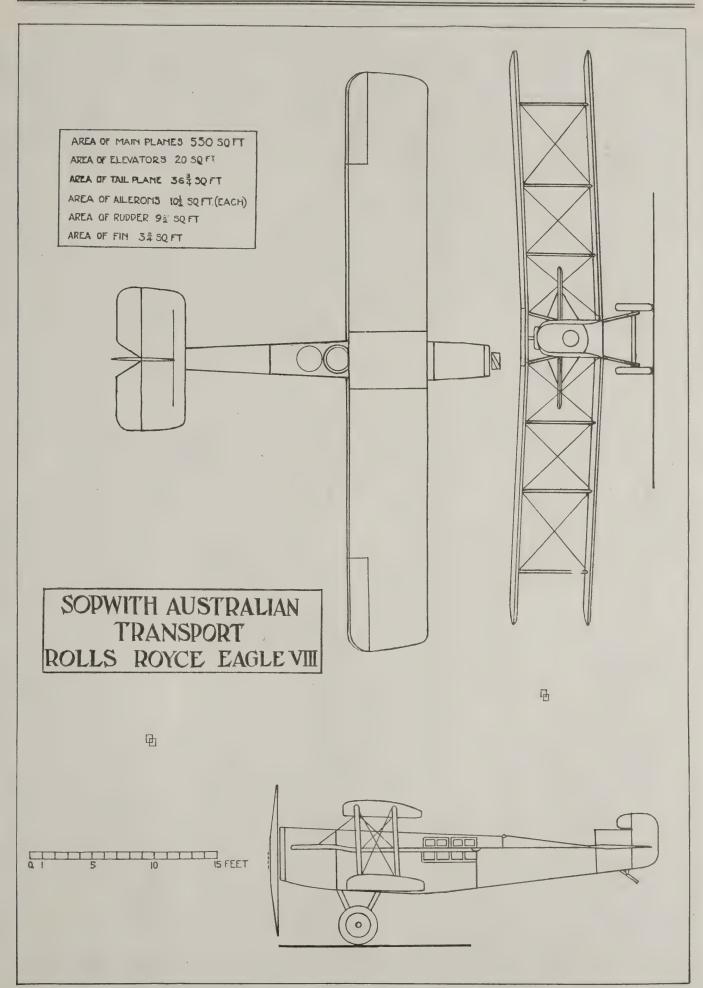
course made good.

A very interesting instrument is fitted to the Sopwith.

This is known as a turn meter and consists of two swivel-This is known as a turn meter and consists of two swivelling tubes, terminating in a funnel at the rear, mounted one on each wing tip in front of the leading edge. These two tubes are connected up to an indicator in the cabin, on which the slightest turn is shown. This instrument should be very useful in case of flying in clouds, when a machine usually begins to swing off her course first to one side and then to the other, until the compass swings to such an extent that the pilot no longer knows quite what the machine is the continued on page 704) (Continued on page 704)



The Sopwith Australian Transport "Wallaby," equipped with Rolls -Royce Eagle VIII



# LAWS6

THERE HAS
NEVER BEEN
A PERSON
HURT IN A
LAWSON
AIRPLANE



HERE IS A FACT — AN ACTUAL PHOTOGRALAWSON AIRLINER PASSING OVER NEW YOR TRIP FROM MILWAUKEE TO WASHINGTON

LAWSON AIRLINE COMPANY

# CREATOR OF THE AIRLINER



FACTS
ARE
BETTER
THAN
FANCIES

OF THE GREAT <u>26</u> PASSENGER CARRYING RETURN.

MILWAUKEE, WISCONSIN, U. S. A.

# B. A. T. "BABOON"

THE "Baboon," designed and built by the British Aerial Transport Co., Ltd., is a two-seater, dual control, training plane. Its leading characteristics are as follows:
Engine: Type
H. P 170
Weight of Machine: Empty, lbs
Loaded, lbs 1,350
Range in miles
Speed (m.p.h.): Ground level 90
Landing Speed (m.p.h.)
Climb (in mins.) to: 5,000 ft
10,000 ft 12
Loads: Per sq. ft., lbs 5.2
Per h.p., lbs
Useful or military load, lbs
Length (overall), ft. ins
Height (overall), ft. ins
Span: Top, ft. ins
Bottom, ft. ins
Chords: Top, ft. ins
Bottom, ft. ins
Wing area: Top, sq. ft

Bottom, sq. ft	125
Total sq. ft.  Gap, ft. ins.  Dihedral, degrees °.  Aileron area: Each, sq. ft.  Total sq. ft.  Area: Tail-plane, sq. ft.  Elevators, sq. ft.	4' 8½" 2° 6 24 27.75
Total sq. ft  Area: Fin, sq. ft  Rudder, sq. ft	39.75 5.25 6.0
Total sq. ft Propeller: Type B.A.T Blades Diameter Pitch	'. Tractor 2 7' 10"
Speed, r.p.m.  Tank capacity: Hours	1,850 4 throttle



The British aerial transport two-seater, dual control, training machine, equipped with 170 H.P. A.B.C. Engine

#### **BOOK REVIEWS**

A STOP AT SUZANNE'S, by Greaver Clover. Letters and prose sketches of an American youth serving with the French Camion Convoi and later as a cadet in the American aviation service. With an

introduction by Samuel Travers Clover.
Greayer Clover, like many another
American lad, enlisted with his college
friends in the French Camion Convoi and served six months, carrying ammunition and supplies up to the men in the trenches. When America entered the war he became a member of the American Aviations Corps, and met his death when his plane crashed to earth in a field back of

These delightful sketches of the life of our American boys in France will find a sympathetic audience in the hearts of all whom the war has touched. He was a typical college student, with a marked literary ability, which developed rapidly in the gallant service in which he gave his

No one can read this happy record of a work happily performed without feeling that it stands as the symbol of a wide national service and courage on the part of American youth.

This book may be purchased from the Aeronautic Library, Inc., 299 Madison Avenue, New York. Price \$1.60.

ELEMENTS OF RADIOTELEGRAPHY. By Ellery

W. Stone.
This text book was prepared for the use of raido students at the Naval Radio School at San Diego and is based on the lecture course in radio theory. cellent paper, the clear bold face type, the well chosen illustrations and the durable binding makes the work of particular adaptability to the student who desires to refer frequently to the text after he is engaged in the practice of the radio art. The first part of the book is devoted to

a study of electrical terms, to elementary alternating current theory of power and then radio frequencies. Sufficient attenthen radio frequencies. Sufficient attention is given to the mathematical side of the subject that the student is able to cope with the average mathematical problems which are encountered in practical radio operating. The development of the theory, however, avoids mathematical demonstration in preference to comparison with the more familiar physical parallels which appeal more clearly to the

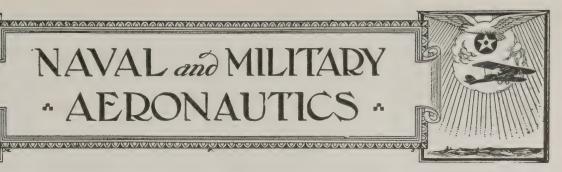
less technical layman. Then follows a series of chapters which describe the advances made in radio science from Maradvances made in radio science from Mar-coni's 1896 transmitter to the modern panel commercial equipments. These chapters not only show the advancement of the science, but the particular functions and theories of each step, so that the student, having taken up practice and theory side by side, is ready for operating practice. A section is devoted to high prover continuous wave transmitters, and power continuous wave transmitters, and finally a section on receiving equipments from the most pioneer and elementary to the most advanced and modern receivers. The theory and operation of the vacuum tube in all its functions is very clearly explained.

Obtainable at the Aeronautic Library, Inc., 299 Madison Avenue, New York

J. D. Reid, who has been attached to the technical section of the Air Service at Paris, has been discharged from government employ and has accepted a position with the engineering force of Brewster & Co. He is stationed at their factory at Long Island City, N. Y.



# NAVAL and MILITARY · AERONAUTICS ·



#### State Guard Completes Plans for Aero Unit

Plans for the establishment of an aero unit to be incorporated in the New York National Guard Division already have been completed, and the unit will be organized immediately after authorization from the War Department has been re-

ceived.

Final authorization will depend upon the enactment by Congress of the bills now before it for the reorganization of the army. The training system in the Na-tional Guard units will be based upon the standard system of the regular army. The National Guard units will have the same type machines and other equipment as the United States Air Service.

#### Reorganization of First and Fifth Aero Squadrons

The First Aero Squadron has been designated as a long-distance bombardment squadron, and reorganized with available personnel at this field. At present there are assigned to it twelve (12) pilots and two (2) observers. The executive pertwo (2) observers. sonnel is as follows:

Commanding Officer: Capt. A. E. Simonin, A. S. A.
Adjutant: First Lieut. Russell L.
Maughan, A. S. A.

Maughan, A. S. A.
Operations Officer: First Lieut. A. M.
Roberts, A. S. A.
Engineer and Supply Officer: Second
Lieut. Lucas V. Beau, Jr., A. S. A.
Commanding Officer, "A" Flight: First
Lieut. A. M. Roberts, A. S. A.
Commanding Officer, "B" Flight: First
Lieut. Fugene H. Barksdale, A. S. A.

Lieut. Eugene H. Barksdale, A. Executive personnel of the Fifth Aero

Squadron, as follows: Commanding Officer: Capt. Harry M.

Smith, A. S. A

Adjutant: First Lieut. C. L. Midcap,

A. S. A. Operations Officer: First Lieut. Paul

J. Mathis, A. S. A.
This squadron has been designated to patrol the coast from Mitchel Field, at Long Island, to Langley Field, at Hampton, Va. At the present time, both the First and Fifth Aero Squadrons are doing this work. this work. In spite of the very bad weather only twice have these patrols been uncompleted. In some cases as many as three snowstorms have been encountered en route.

A school for instruction has been established at this field to carry out a training program as directed by the Director of Air Service. At present about twenty-eight (28) officers attend this school daily. A great deal of interest has been shown on the part of all and it is expected that marked progress will be made in this

training.

# Record Altitude Made by the 8th Aero Squadron.

The 8th Aero Squadron on duty at Mc-Allen, Texas, seems to have surpassed all other squadrons in the United States in reaching high flying. Lieut. Fonda B. Johnson flying a DH-4 reached an altitude of 16,700 feet for "Flight B". The greater part of the flight was made be-

tween two layers of clouds, the lower strata which was of 1000 feet thickness being penetrated at an altitude of 9000 feet and the upper layer was reached at 16,700 feet but could not be penetrated because of darkness. His record almost reached that made by Lieut. James Haiz-lip "Flight A" last week when he attained an altitude of 18,500 feet. This record to date stands unbeaten by any squadron in this country and speaks well of the work done by the 8th Aero Squadron.

#### Parachute Tests Being Conducted at McCook Field

The Engineering Division of the Air Service at Dayton, Ohio, has conducted two successful parachute jumps, using a

new pack type parachute.

Sergeant (1st class) Ralph Bottriel and James Russell, a civilian, ascended to an altitude of 2,000 feet in a Martin Bomber aeroplane equipped with these pack type parachutes, which were developed by the engineering section for use on all type of aeroplanes. Mr. Russell jumped from the wing tip of the Martin Bomber, landing on the ground in one minute and 23 3/5 seconds, while Sergeant Bottriel followed him by jumping from the rear gunner's cockpit and landed in one minute and 24

A great deal of interest has been aroused in connection with the test at this field, and at the present time ten non-commissioned officers are under instruction in connection with their use under the in-struction of Air Service engineers.

Upon completing their course, they will be sent to the various fields where they will act as instructors.

Austrian Seaplanes for U.S. Navy

The United States Navy now has two Austrian seaplanes which have been secured by the commander of the United States Naval forces in the Eastern Mediterranean, Rear-Admiral Philip An-drews, by arrangement with the Italian Government. One of the seaplanes has a 12-cylindered 450 h.p. Austro-Daimler motor, while the other has a six-cylindered tor, while the other. 250 h.p. Hiero motor.

#### R. A. F. Up to Authorized Strength

The British Air Ministry in a recent report relative to a recruiting campaign, opened a short time ago by the Royal Air Force, announced that recruits have applied in such numbers that the force is now up to its authorized strength.

The attractive new conditions of service and rates of pay are responsible for this result and the authorities are well pleased with the class of men applying.

#### Personal Pars

Capt. Harvey W. Cook, A. S. A., who is credited with the destruction of four enemy balloons and three planes, has received his discharge and left Kelly Field for the Texas oil fields. Captain Cook is from Anderson, Ind., and was with the French driving an ambulance when the United States declared war on Germany. At that time he joined the U. S. Flying Corps at Issoudun. He was later engaged in ferrying ships to the front and from the supply depots in France and England. About the middle of July, 1918, he joined the 94th "Hat-in-the-Ring Squadron" and was with this squadron during the remainder of the war.



Flight Commanders and Mascot of the 1st Aero Squadron at Mineola. From left to right: 2d Lieut. Willis R. Taylor, Deputy Flight Commander; 1st Lt. Alex. M. Roberts, Operations Officer, Flight "A" Commander; 1st Lieut. Eugene H. Barksdale, Flight "B" Commander; Miss Isabel Sherman, Squadron Mascot; 1st Lt. Phillips Melville (twin-engined aeroplane pilot) attached to squadron



#### **FOREIGN NEWS**



#### New German Monoplane Built of Aluminum

New German Monoplane Built of Aluminum

Through the forced landing of a new German monoplane which fell into the hands of Lithuanians at Abele. near Dvinsk, details of the construction have leaked out. This machine, which is said to have attained a height of 7,000 metres with eight persons aboard, is from the firm of Junkers Flugzeug-Sverke A.G., of Dessau. It is constructed almost entirely of corrugated aluminum, and has a total weight, without fuel and passengers, of about one ton. The wings are of unusual thickness, but their apparent solidity near the fuselage on either side is deceptive, for in reality they are hollow and contain the gasoline tanks, a spare propeller, and a spare set of wheels. The body of the monoplane, which rises high above the wings, contains a snug little cabin fitted up very much like the interior of a luxurious limousine, with upholstered arm-chair accommodation for six passengers. The "cockpit" seats two pilots and is also perfectly screened from the wind. Thanks to the absence of visible wires—those used being hidden in the wings and fuselage—the monoplane has an aspect of weight and massiveness weirdly at variance with the idea of flight.

#### China Plans Military and Trade Aviation

China is preparing to greatly enlarge and develop both military and commercial aviation. The Ministries of War and Communications have completed plans for the establishment of an efficient air service for the Republic of China and information indicates that President Hsu Shih Chang is promoting the construction of a modern aerial service between Peking, Tientsin, Shanghai, Hongkong and Canton. The Minister of War is enlarging the Chinese aviation school at Nan-yuan, where aviation instruction is given for both military and civil purposes.

The order for aeroplanes given by the Chinese Government to Vickers. Vimy type of planes, 42 ft. long, 15 ft. high, and 67 ft. wide, carrying two Rolls Royce engines, with a total of 750 h.p. Their maximum speed is 115 m.p.h. They carry two pilots and seat twelve passengers in the cabin, which is enclosed. The maximum weight of freight and mail combined will be 2600 lbs.

#### Refuse to Allow Police Aeroplane Service in Germany

Paris.—The Council of Ambassadors considered the demand of the Germans and Austrians that they be allowed to preserve aeroplanes for aerial police service.

The demand was rejected as contrary to the terms of the peace

#### Record Mediterranean Flight

Cairo.—The two aeroplanes belonging to the South African government which are attempting a flight from London to Cape Town crossed the Mediterranean in fourteen hours. This is said to be the first nonstop flight over the Mediterranean.

In view of the fact that part of the navigation was made during the night in a furious wind, which one of the pilots said blew his aeroplane backward for ninety minutes, the passage is regarded as a remarkable achievement.

Swiss Organize for Aviation Development
Although the commercial use of aeroplanes in Switzerland is still in its
infancy, many manufacturers are organizing and planning for extensive

infancy, many manufacturers are organizing and planning for extensive trade.

A school has been established known as the Ecole "Aero" Lausanne, where pilots will be trained with "Aero" made aeroplanes, which are biplanes with double steering gear.

Another concern has been established under the name of "Aero" Luftbildverlagsanstalt, which will devote itself primarily to aerial photography and which is using German biplanes with a capacity for a pilot and two passengers.

An aerial passenger concern has been established in Geneva under the name of Avion Tourisme, which is making regular flights with a hydroaeroplane equipped with two 200 hp. Isotta-Frachini engines.

#### Outline British Air Routes

Outline British Air Routes

The report of the British Advisory Committee on Civil Aviation, on the establishment of Imperial Air Routes, deals with the use of heavier-than-air machines, and the establishment of main trunk lines between the various portions of the British Empire, including Canada, Newfoundland, South Africa, India, Australia and New Zealand.

The report believes that the proper route for initial action is between England and India and ultimately from India to Australia, with second choice a route from England to South Africa, which between England and Egypt, would be over the same route as is contemplated to India.

The committee decided against the use of the Royal Air Force squadron for civil purposes. It considered operation by the State itself, the formation of a chartered company combining State and private capital, and private enterprise aided by the State.

The committee also suggests that a certain quantity of the aircraft engines and material which have been declared surplus by the Royal Air Force should be placed at the disposal of the Civil Aviation Department for distribution free in England and India should be removed.

#### Aeroplanes to Carry Freight

Air routes on which freight will be carried between London, Paris and Brussels are to be established next spring.

#### Ban on Civilian Flights Lifted in India

Civil aviation in India was prohibited pending the issue of rules which have now been published, and firms which made preparation in advance for the introduction of non-official flying have been able to make a beginning.

The rules provide for the licensing of pilots, the inspection of machines, the regulation of air traffic and the general protection of the public. No pilot's license will be granted to any one who is not a British subject, except under a general or special order of the Governor General in council. An applicant will have to prove his mental and physical fitness,

and he may be required to submit proof of recent flying experience or to undergo practical tests.

Special officers are to be appointed to inspect and overhaul passenger aircraft periodically. As regards traffic in the air flying machines are always to give way to airships and airships to balloons, wether fixed or free.

The route of the Karachi-Bombay service will be overland via Navanagar if the Maharajah of the state approves of the establishment of an intermediary aerodrome at his capital.

#### Hydroaeroplanes In Amazon Service

Hydroaeroplanes In Amazon Service

Para, Brazil.—Aeroplanes may be employed to map the valley of the great Amazon river. If the French are successful in their effort to use aircraft for surveying the routes of the rivers of French Guiana, it is understood the Brazilian government will apply the same method to the survey of the Amazon and its affluents. A French company is said to have been formed in Cayenne, with hangars on the Maroni river, and French aviators with flying experience gained in the war are being employed.

In addition to making maps, the machines will be employed for carrying freight, mails and passengers. There are immense rivers in French Guiana which, because of the presence of many rapids, are now only navigable in canoes which take weeks to transport freight over distances which the hydroaeroplanes can cover in as many hours, with always large stretches of smooth water offering a suitable surface for landings and "take-offs."

The traffic is expected to consist mainly of gold, balato and essence of rosewood, which are the principal exports of the colony.

#### British Aeroplanes on Trip to Cape Town.

British Aeroplanes on Trip to Cape Town.

London.—A South African Government aeroplane left the Brooklands aerodrome and arrived in Turin, Italy, the same day, after a one-stop flight. The plane is attempting to fly to Cape Town, South Africa.

First attempts to fly from Cairo to Cape Town will be watched in England with interest.

The Daily Times already has a big aeroplane at Cairo, which flew there from England. It will start on the first lap of the southward journey to Atbara, 870 miles up the Nile. It will carry a crew of five and a scientific observer.

Peter Chalmers Mitchell, astronomer and secretary to the Zoological Society of London, was passenger in a plane which left for Cape Town, rising from an aviation field near this city.

Construction of landing places and accumulations of gasoline and stores throughout the route to be followed has just been completed.

The British aeroplane DH-14 left Lympne, in Kent, for Cape Town.

#### Plan Exploring Tibet with Aeroplanes

Shanghai.—Huge passenger aeroplanes probably will be used by Roy Chapman Andrews, of the American Museum of Natural History, New York City, in exploring Tibet next summer. Mr. Andrews says his next expedition probably will make its way into the heart of Chinese Turkestan and that he will be accompanied by fifty scientists.

#### Police Aeroplanes Over Berlin

As a sequel to the riots in Berlin last week, low-flying police aero-planes were engaged in patrolling over the roofs of the city on January 15, watching for an attempt to renew the Spartacist disturbances on the anniversary of the death of Rosa Luxemburg.

#### The \$2,500 One-Man Aeroplane

The \$2,500 One-Man Aeroplane

A machine which is the aerial equivalent of the canoe or skiff or the small car has been put on the market by the Austin Motor Co. Ltd, under the name of the "Austin Whippet," and a first batch of fifty are actually under construction after a series of exacting experimental flights. A good deal of flying of one sort and another has now been done with the Whippet.

This handy little single-seater recently made the journey from the Company's flying ground at Longbridge, Birmingham, to Bristol, a distance of ninety miles, in a cross wind in one hour. Though the "Austin Whippet" answers its controls readily the machine is inherently stable, and can be flown with hands off the joy-stick. An ordinary amount of common-sense is all that is required to fly it, and it lands at the convenient speed of 35 m.p.h. Its range of flight with standard tanks is 182 miles.

The fuselage is constructed throughout of steel tubes, and the wings of 21½ ft. span are designed with a strength to take seven times the load they actually sustain. For storing the machine the wings can be folded back by one man and the machine's dimensions are then 16 ft. 3 in. long, 7 ft. 6 in. high and 8 ft. width, so that it will go into a small shed.

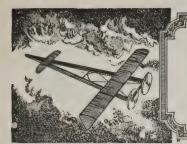
All calculations for the design of the Whippet have been checked and approved by the Air Ministry, who have granted a certificate of airworthiness to the machine.

French Planes to Fly Across Sahara

Paris.—Three Breguet biplanes left Villa Coublay for Timbuctoo. The proposed route is via Lyons, Istros, over the eastern coast of Spain to Rabat, thence to Algiers, Biskra, Insalah, Tesnou, Tanzouaten, Timbuctoo and Dakar. Major Vuelleman-Fotmous is in command of the expedition.

He has six aerial victories, 200 bombardments and seventeen mentions in despatches already to his credit, as well as the finest French flight since the armistic, that from Paris to Constantinople and Cairo and back. Accompanying him are Capt. Mezergues and Lieut. Dagnaux, a daring pilot with a wooden leg.

The expedition is one of considerable military importance and it is expected that Gen. Neville will cross the Sahara to Timbuctoo by aeroplane once the air trail has been blazed. As it is the journey across the desert by camel caravan takes several months and inevitably means considerable hardships. So far attempts at aerial crossings of the Sahara have been attended by ill fortune.

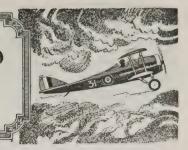


# ELEMENTARY AERONAUTICS

# and MODEL NOTES

By John F. M-Mahon

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#### Designing a Model Aeroplane (Continued)

Excerpt from F. J. Conner's book on Model Aeroplanes

It is usual to make the diameter of an air screw equal to one-third the span, and the pitch one and a half times the diameter. For twin screw models no hard and fast rule exists with regard to diameter, for, since the torques of the oppositely revolving screws will counteract one another, they can be made of rather large diameter and fairly long pitch, although it is not advisable to make the pitch longer than the circumferential measurement of the disc swept by the screw; that is to say, the pitch angle should not exceed 45°.

Another rule which is vitally important to the success of the machine is that the centre of pressure must be coincident with the centre of gravity. The centre of gravity is easily located by balancing the model on a knife edge, but the centre of pressure is more difficult to determine. It is generally situated at a point one-third the chord from the leading edge, hence the wing should be temporarily fixed—with this point directly over the centre of gravity, the mainplane being adjusted to its correct position afterwards. The maximum camber or curvature of the ribs should also be placed as nearly as possible on the c.p., the greatest depth of camber being made from one-twelfth to one-sixteenth of the chord. For very deep cambers double ribbing and double surfacing are essential, the bottom camber being made about one-half that of the top.

Referring to the question of the most suitable loading for general purposes, i.e., for models not designed purposely for distance or duration, it is general practice to use a loading of from 4 oz. to 6 oz. per sq. ft. I certainly would not advocate a lighter loading than 4 oz. per sq. ft., for I have noticed that great difficulty is experienced in tuning or adjusting models loaded under this figure, a certain sluggishness being apparent; apart from which they require to be flown in comparatively calm weather conditions, this point alone constituting a big disadvantage. The writer personally prefers a loading of 6 oz. per sq. ft. (referred to by many as the ideal loading), no difficulty having been experienced in flying models thus loaded in winds up to fifteen miles an hour. For racing models I have used 10 oz. per sq. ft., and for duration models 6 oz. per sq. ft., and these loadings have, apparently, given the best results. I recall a case in point which substantiates the above inference re light loading. The writer had a large rubber-driven model which flew considerably better when the loading was increased by placing a dead weight of 3 oz. over the centre of gravity. There is one other point worthy of note in connection with this model. It weighed some 20 oz., and was driven by two skeins of rubber, each consisting of ten strands of ½-in. strip, the power being transmitted through equal gearing to the tractor screw. These skeins took thirty seconds to run down when wound to 600 turns; and yet a model of similar weight, length, etc., constructed by a friend, driven by two skeins of six strands each, transmitting their power to a similar propeller through a reduction gearing of two to one, under a similar test gave exactly the same results, viz., thirty seconds for 600 turns. The two skeins of rubber were equally geared to obviate torque on the fuselage, the reduction being by means of a larger gear screwed to the propeller boss, which meshed with one of the smaller ones.

With regard to the weight limits for rubber-driven models, the heaviest known model to date that has flown successfully is that built by W. E. and J. Rogers, who built a huge tractor biplane weighing no less than 2 lb. 4 oz. It had a built-up fuselage covered with aluminium foil, four 12-yd. skeins of rubber equally geared to the propeller, and was 6 ft. in span. I had the pleasure of witnessing some of its best flights, and, judging from its behaviour in the air, one would have thought it to be no more than a 4-oz. model. Its best flight to date is 200 yards, duration about twenty seconds. Some of the writer's best flights have been made with a model which weighed nearly 20 oz. The results of the weight-lifting competitions have proved that it is merely a matter of careful design to obtain good results from heavy machines; besides which there exists more room for ingenuity with large models than with small ones. Further, there is evi-

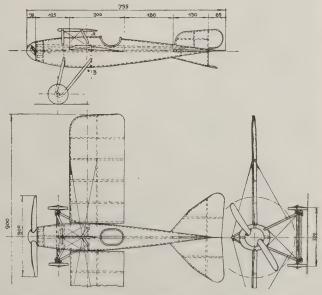
dence that the K.M.A.A., when it resumes its activities, will encourage the construction of much larger models than is at present the case.

The question of weight, then, is one which to some extent must be left to the reader, although from the foregoing it will be gathered that a reasonable weight that admits of rational design would be from 1 lb. to 1½ lb. Great controversy formerly raged round the question of weight versus surface rating for competition models, but the point was ultimately partly settled by the weight and surface of competing machines being limited in some of the Association's contests.

Alluding to the important question of the best type of model for appearance in the air, the tractor stands pre-eminent, albeit it is a little more difficult to fly. This is partly due to the fact that the revolutions per minute of the screw are decreasing from the moment the model is released, whence the slip stream and, consequently, the lift of the main plane is not constant, this tending towards bad longitudinal stability. This tendency, however, can be counteracted by an adjustment to the angle on the tail, which should always be a negative one. The rudder should be placed above the centre of gravity and must not be made too large. It is difficult to specify with regard to the area of the rudder, the length of machine, screw diameter, and speed being three salient points upon which it is dependent. Bad lateral stability, too, is often attributable to a wrongly proportioned rudder. The centre of thrust should be placed slightly above the centre of gravity to counteract the tendency to "stall." Care should also be taken to fit a screw of the correct pitch; too fine a pitch causes a stall and a resultant dive.

A type of model very successful in open competition is the 0—1—1—P2, flown with great success by Mr. A. F. Houlberg. A very fine adjustment seems necessary with this type, and it will be found that a swept back wing of the Handley Page type gives best results. It should be borne in mind that negative tips are essential with this form of wing, as is a very slight dihedral angle. One cannot say that this type presents an altogether pleasing aspect in the air, the long projecting spar "with nothing on it" detracting much from its appearance. However, one must judge from results, and the 0—1—1—P2 has achieved much in open competition, although the British record of 2 min, 49 secs. is held by a "tail first" machine. It is intended, however, in a future chapter to give sketches and a discussion on the merits, or otherwise, of the various types.

(To be continued)



Drawings of a successful German model. The dimensions are given in milimeters; to get inches divide by 25. For instance, 200 divided by  $25 \equiv 4$  inches



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested Initials of contributor will be printed when requested.

Rawther Upsetting
To take a maid up in a plane Is foolish without doubt; It is a most unhealthy place To have a falling out.

Some Brand

"How do you like that cigar I gave you, old man? For 200 bands off that brand they give you a gramophone."
"You don't say! If I smoked 200 of those cigars I wouldn't want a gramophone; I'd want a harp."—Houston Post.

He—"I want some underwear."
She—"How long?"
He—"I don't want to rent it."—Voodoo.

Back Again

Back Again
Well, now I've quit the uniform,
I'm with the folks again;
I've met my girl, I've seen the town,
They've almost made me vain
With praisin' up the stunts I did.
There's not a thing I've missed,
And yet—say, Bud, oh hang it all,
I'd like to re-enlist!

I've got a job, an' "settled," but
I'm restless just the same,
For after chasin' Heinies there
I must admit it's tame.
An' out of doors—that gas you know—
These times—the Bolshevist—
The country's flag—Oh, hang it all,
Say, Bud, I'll re-enlist!

-Alfred N. Phillips, Jr.

#### MAYOR HYLAN'S SKY COPS



(Courtesy N. Y. World)

The Missing Deacon

One of the prominent deacons in an Ohio church was seriously ill. As he was very popular among the congregation, a bulletin board was posted in front of the church to inform his friends of his condition. It read:

"One o'clock. Deacon Jones very ill."

"Two o'clock. Deacon Jones is worse and sinking rapidly."

"Three o'clock. Deacon Jones dead."

A traveling man passing by that evening read the bulletin and seeing no one in sight added at the bottom:

and, seeing no one in sight, added at the bottom:
"Seven o'clock. Great excitement in Heaven. Deacon
Jones has not yet arrived. The worst is feared."

"This seems to be a very dangerous precipice," remarked the tourist. "I wonder that they have not put up a warning board.

"Yes," answered the guide, "it is dangerous. They kept a warning board up for two years, but no one fell over, so it

#### Kamarad!

Two Tommies went into a restaurant on the eastern front and said to the waiter, "We want Turkey with Greece." "Sorry," the waiter replied, "but we can't Servia." "Well, then, get the Bosphorus."

The boss came in and heard their order. Then he said "I don't want to Russia, but you can't Rumania."
So the two Tommies went away Hungary.

Some Mess

Customer: "Waiter, give me some hash, please."
Waiter (ex-army cook), shouting back to the cook: "Clean up the kitchen."—American Legion.

"Yes, my dear, that is a man-of-war."
"How splendid! And what is that little one just in front?"
"Oh, that's just a tug."
"Oh, yes, a tug.of."

"Oh, yes, a tug-of-war. I've heard of them."—American

The astronomers are expected to aid in the hunt for moon-

#### Another Expense

Mrs. Hayseed (reading a letter from her son)—"Bill's got a furlough and he's comin' home for a few days."

Mr. Hayseed—"Got a furlough, eh? Well, he needn't expect me ter buy gasoline fer the durned thing."

Some Sensation

"Did you read about that French Army aviator who made 314 loops in one flight the other day?"

"Lucky dog! I've had that sensation myself, but not since last June."

The officer of the deck, desiring the reading of the compass, sent a hospital attendant, the only man within call, to the cabin to get the reading. The attendant returning reported the reading normal.

"What do you mean by normal?" asked the surprised

'Ninety-eight degrees, sir."—Judge.

The Reason

She-George, you looked awfully foolish when you pro-

He-Well, very likely I was.-London Opinion.

# THE NATIONAL LIBERTY INSURANCE CO. OF AMERICA

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(Continued from page 685)

greatest maximum speed obtainable combined with slowest landing speed for safety.

"We in Texas want to win the Gordon Bennett Aviation Trophy for the United States and bring the next international aviation race to Texas. To achieve this, I am willing to pay \$100,000."

France has won the trophy twice in succession and if she wins it this year the trophy will become the permanent property of the Aero Club of France. It is known that France will make every effort to win it and it is understood that aeroplanes capable of great speed are being designed by the best French aeronautic engineers for this race.

England and Italy are also employing their best aeronautic talent to design and build cup winners. Among the other fourteen countries which are scheduled to compete there are also expert aeronautic engineers figuring on speedy races for this contest. Mr. Augustus Post, Secretary of the Club, who has just returned from Europe, where he flew from France to England, then to Belgium and to Italy, Switzerland and Sweden, reports that to win the Gordon Bennett Cup it will require a speed of 200 miles an hour. Mr. Cox owns three aeroplanes, which he uses every day in Texas in connection with his oil operations which extend over 200 miles of land owned or leased by his company. It will be recalled that Mrs. Cox flew from Houston to New York a few months ago, to

Cox flew from Houston to New York a few months ago, to take her son to school.

The Gordon Bennett Aviation Cup Race is to be held in France in September. Three entries are allowed to each of the eighteen national aero clubs of the International Aeronautic Federation and each club selects the three contestants for the country it represents. The Aero Club of America has won two contests out of five, in 1909, which was won by Glenn H. Curtiss, and France also won two and England one. In the last race held before the war, Maurice Prevost, the French aviator, made a speed of 124 miles. In 1911 it was won by Charles T. Weymann.

The type of aeroplane ordered by Mr. Cox is kept secret, but it is known that the order has been placed for two machines capable of a speed of not less than 200 miles an hour. "They will be of American design, American manufacture, equipped with American motors and made entirely of American material, and will be flown by an American aviator," Mr. Cox told the Contest Committee of the Aero Club of American

ica, "they will be aeroplanes of a speed of not less than 200 miles an hour, but capable of slow landing speed, which will remove the danger of landing at high speed.

"While being willing to spend \$100,000 to bring back the Gordon Bennett Trophy, I am also anxious to develop an aeroplane at the same time which will represent a marked advancement from the standpoint of aeronautic engineering and usefulness."

Mr. Henry Woodhouse points out that the designing and constructing of an aeroplane capable of making 200 miles an hour will be stupendous history making achievement in the science of aeronautics. "To fully understand the significance of such an achievement one must consider the fact that there is not in existence today engineering data upon which the design and construction of an aeroplane of 150 miles per hour speed can be based. Nor are there aerodynamic laboratory speed can be based. Nor are there aerodynamic laboratory means of testing a model of an aeroplane intended to make 150 miles or over per hour. The fastest wind tunnel for testing aeroplane models and determining their efficiency has a wind speed of less than 150 miles an hour. The engineers and constructors of the 200 mile per hour racer will, therefore, be writing history in aeronautic engineering when designing and building these machines.

"This development will also be of great value from a military standpoint. Practically all the engineering data and experience which enabled the Allies to build fast military and naval aeroplanes in the first two years of the war had been

naval aeroplanes in the first two years of the war had been obtained from designing and building fast aeroplanes and

seaplanes for racing before the war.

"Sportsmen gave aeronautic engineers inducements and a free hand. They asked them to produce their best and the engineers did their best and each succeeding Gordon Bennett Trophy race brought great increase of speed combined with efficiency of design and improvements in air worthiness

ethelency of design and improvements in air worthiness.

"The Gordon Bennett Trophy was won in 1909 by Curtiss with a speed of less than 50 miles per hour; in 1910 by Grahame-White with less than 63 miles per hour; in 1911 by Weymann with a speed of less than 79 miles an hour; in 1912 by Vedrines with a speed of close to 110 miles an hour, in 1913 by Prevost with a speed of over 110 miles an hour!

"Now that over two thousand aeroplanes have been purchased for sport pleasure touring and transportation, and the

chased for sport, pleasure, touring and transportation, and the demand is increasing daily, it is a good investment to a manufacturer to produce an international winning aeroplane. It creates a market for his aeroplanes the world over."

# THE MACHINE YOU WILL EVENTUALLY FLY!!



# MARYLAND PRESSED STEEL CO., (AIRCRAFT DEPT.)

Sales Manager, HARRY E. TUDOR

299 MADISON AVE., NEW YORK CITY

(Continued from page 694)

The Rolls-Royce "Eagle," Mark VIII, is placed immediately behind a nose radiator, and is supplied with gasoline from a gravity tank placed in the top centre section. Petrol is forced from the main tank, which is placed between the engine and the cabin and has a capacity of about 200 gallons, to this top tank. A very ingenious flow meter is fitted on the latter, indicating at any time the rate at which the fuel is being consumed. In the top centre section is also placed a water tank holding about 25 gallons of water, connected up to the radiator by a flexible rubber tube. Another tube, it might be constituted in the constitute of the radiator by a flexible rubber tube. mentioned incidentally, runs from the nose of the machine, through the engine housing and to the cabin, supplying the latter with fresh air. Two long exhaust pipes run back to the rear of the cabin, and serve as very effective silencers, the noise inside when the two panels in the roof are closed being almost negligible.

As will be seen from the scale drawings, the Sopwith is a three-strutter, the large span making this arrangement advisable. The under carriage is of the usual simple Vee type, with rather a narrow track. Wing tip hoops have therefore been fitted.

For the rest, the Sopwith follows standard practice in design and construction. The tail plane is provided with the usual trimming gear, the wheel control of which may be seen in the side view of the machine. There is a rectangularshape vertical fin, to which is hinged the balanced rudder.

As will be seen from the general arrangement drawings, the total wing area is 550 sq. ft. The weight of the machine, empty, is 2,780 lbs., which gives a wing loading, empty, of 5.05 lbs./sq ft. and a power loading, empty, of 7.75 lbs./h.p. As already mentioned, the tanks have a capacity of 200 gallons, and with the weight of occupants and full equipment the weight "all on" is 5,200 lbs. This gives a wing loading of 9.45 lbs./sq. ft. and a power loading of 14.5 lbs./h.p. With full load the maxinum speed is about 121 mp.m. and the With full load the maximum speed is about 121 m.p.m., and the minimum speed 48 m.p.h. The cruising speed at 5,000 ft. and at a petrol consumption of 15 gallons per hour, is 107 m.p.h., which gives a range of about 1,500 miles. This is ample for any overseas distance that has to be covered during the flight to Australia, and should also give a very good margin for any of the overland stages over country unsuitable for landing of the overland stages over country unsuitable for landing.

As an example of the efficiency of the Sopwith "Wallaby" it is of more than passing interest to note that the ratio

Useful Load 2,420

= 46.5 per cent., which is distinctly

5,200 Total Weight

good. Incidentally, it might be mentioned that the usefulness of the "Wallaby" is by no means restricted to the flight to Australia. By altering the cabin and seating accommodation it is possible to get in eight people (including the pilot), when the machine would have a range of 500 miles at a speed of 107 m b. of 107 m.p.h.

#### Aircraft Industry Flourishing (Editorial in Rochester Times)

N view of statements made before military committees of Congress to the efffect that the aircraft industry of the United States had been allowed to go to ruin it is interesting to note that a report made by the Aero Club of America says that the "aircraft demanded for civilian purposes is large enough to support the aircraft industry of the United States on a permanent basis."

This report covers the situation down to the end of last month, so that it may be regarded as giving up-to-date information. It states that during the past year the aircraft industry was obliged to turn down \$50,000,000 in orders because of inability to make deliveries.

Presumably the Aero Club has made a careful investigation and is not painting the situation in too rosy colors. No doubt certain factories or portions of factories devoted to producing aeroplanes of strictly military type have been closed down.

Yet it seems clear that the manufacture of aeroplanes for commercial purposes and general private use has really arrived and has good prospect of steady growth.

America's automobile trade far surpasses that of other countries. Now it seems likely that if our aircraft manufacturers are able to keep up with the times this country will take a decisive lead in output in this new field.

# The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington 350 mill Washington to New York and return	
(four times)	
Washington to Dayton and return	
(two times)	

When the Martin Bomber commanded by Colonel R. S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

#### The Glenn L. Martin Company Cleveland

Contractors to the U.S. Army, Navy and Post Office Departments,

FIRST IN WAR

FIRST IN PEACE

# Quality Tells in the Long Pioneering Flights

#### American-French Aero Exposition, purchased announces that Inc.,

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The aeroplane is in itself a novelty. Circular spinning and diving from a machine, when witnessed by an observer, represents a peculiar value, the cause of which it is difficult to describe. Advertising distributed from our aeroplanes is surrounded by an atmosphere of romance sufficient to cause people who ordinarily would not even glance at advertising literature to scramble eagerly in their efforts to secure as many copies as possible. These are taken to their homes and offices, where they are exhibited to visitors as costly souvenirs.

The experience gained while touring some of the Southern States as the Fifth Liberty Loan Circus, demonstrated that "bombs" and dodgers and other advertising material fluttering from

the sky into crowds is practical.

From your own experience, you realize that AERIAL ADVERTISING is a striking and efficacious method of presenting your product to the masses, and we have worked out several novelties unique in color and original in design, which will interest you. Compared with the results obtained, our rates are lower than you are now paying for newspaper and magazine space, and we can accomplish your aim efficiently and at less expense than you can do it by any other means.

We have a large staff of aviators and practical men in our employ for the mechanical part of our work, and in addition we have the advertising men and means of making your aerial advertising of extraordinary value. One of our representatives will gladly call upon you and outline our plan, without obligation.

This company maintains a register for Pilots, Aeronautical Engineers, and Mechanics available for aviation companies seeking the services of such. The above are invited to register their name, address, class of work, and salary expected. There is no charge to the companies or those registering for such service.

(The agency will be glad to hear from aviators and companies, or balloonists who have balloons, available for advertising purposes in any part of the world and who are in a position to undertake and carry out business of this kind. Information in regard to special Aerial Routes in the United States furnished on application to prospective advertisers.)



THREE SEATER-150 H.P. HISPANO ENGINE

# LINCOLN-STANDARD H. S. Biplane

The Original Standard J-1 Government Training 'Plane

Can furnish either two or three seater. Orders received now and delivered promptly.

Airplane Spares; Extra Engines; Hangars; Wire Cables; Wheels; All Kinds Aircraft Material.

Write at once and let us know your wants.

# Nebraska Aircraft Corporation

Lincoln, Nebr.

(Continued from page 690)

Praeger denied statements of its critics Praeger denied statements of its critics regarding aerial mail flight failures, declaring that it has been 90 per cent efficient, with only forty-four failures in 600 flights during the last six months.

A powerful mail plane, Praeger said, is being developed to carry mail over the mountains to San Francisco, and a new British triplane is to be tried out between

British triplane is to be tried out between Chicago and Omaha.

For the first time in this country snow skids are being used on mail planes, Praeger said, to facilitate landings.

#### Census Blanks By Aeroplane

MIAMI, Fla.-Personal enumeration blanks were recently sent by aeroplane from Miami to Bimini, in the Bahama Island group, 40 miles distant, to be used in taking the census of Floridians employed there.

#### Wanamaker Fliers Make Safe Landing

Wanamaker Fliers Make Safe Landing

The seaplane, manned by six members of the winter colony at Palm Beach, Florida, which had been sought following its disappearance on a flight from the Bahamas to the Florida mainland, made port under its own power at Vero, a town seventy miles north of Palm Beach.

The passengers were Rodman Wanamaker 2d, son of Thomas Wanamaker, of Philadelphia; Gurnee A. Munn, of Washington, son-in-law of Rodman Wanamaker, of New York; Philip Boyer, of New York, banker and president of the Hudson-Wright Airplane Company; Caleb S. Bragg, of New York, winner of the fourth international Grand Prix automobile road race and premier amateur driver. bile road race and premier amateur driver of America, "Jack" Rutherford, of New

York, where he is prominent in society, and David H. McCulloch, pilot of the plane and a member of the crew of the naval seaplane NC-3 in the United States Navy transatlantic flight.

Wanamaker and his five companions Wanamaker and his five companions put to sea for a trip to the Bahamas, which lie about 100 miles off shore. Their craft was a flying boat of the HS2-L navy type, equipped with a Liberty motor. The men took a lunch, a keg of drinking water and some fishing tackle.

Clifford Webster of New York, returning in another plane from Westend Island of the Bahama group, reported that the Wanamaker machine had left that island at 3 o'clock that afternoon on a return trip to Palm Beach.

The Navy Department at Washington was notified and promptly sent instructions to stations in the vicinity, suggesting that all possible aid be extended in the search for the missing plane. power boats, a few navy craft and a fleet of airplanes searched the area extending thirty miles east, north and south of Palm Beach.

Mr. Munn said on his arrival that while stranded and floating on the open sea, they had spied one of the searching

sea, they had spied one of the searching airplanes and had tried to signal it, but without success. The seaplane was not equipped with wireless.

Mr. Munn said that engine trouble had developed just at dusk when the plane was within thirty miles of home. Darkness prevented the completion of repairs on the engine until morning.

#### Personal Paragraphs

Arthur Berndt, who was formerly an aeronautical mechanical engineer in the employ of the Bureau of Aircraft Pro-

duction, has left the United States and is now located in London.

Harrison H. Boyce, vice-president and general manager, Moto-Meter Co., Inc., Long Island City, N. Y., has organized the Boyce-Veeder Corporation, also of that city. He has been elected president of the new organization and will divide his time between that and the Moto-Meter Co.

Gordon M. Evans has been discharged from the engineering division of the Ordnance Department with the rank of captain and has accepted a position in the Detroit office of the Aluminum Castings Co., Cleveland, Ohio.

#### Films by Air

Topical cinematograph films have been flown from France in Handley Page commercial aeroplanes to enable public events abroad to be shown on the screen in England within a few hours. It is anticipated that the co-operation of the aeroplane and the cinema will enable films of happenings abroad to be displayed to the public almost as soon as they are dealt with by the newspapers.

#### Plan Aid to Air Board

Ottawa.—The Canadian Research Council has appointed an air research committhe of four to cooperate with the Dominion Air Board in the development of aeronautics throughout the country. The committee will have associate members in all parts of Canada and will undertake investigations independently as well as with the Air Board. with the Air Board.

# WEEKLY

ol. 10, No. 20

MARCH 1, 1920

10 CENTS A COPY



Aviator and Cameraman Fly Over Crater of Mt. Lassen for Fox Film Corporation

Dayton, the Birthplace of the Aeroplane, Makes Entry in International Aviation Contest to Strengthen America's Chances

Bristol Geroplanes



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Do not fail to see it at our private exhibition March 9th to 13th, during the New York Aeronautical Show, in the magnificent Red Room of

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#### THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879

Copyright THE AERIAL AGE CO, March 1, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X.

NEW YORK, MARCH 1, 1920

NO. 20

# DAYTON, THE BIRTHPLACE OF AEROPLANES, MAKES **ENTRY IN INTERNATIONAL AVIATION CONTEST** TO STRENGTHEN AMERICA'S CHANCES

HE Aero Club of America received a telegram from the veteran aviator Howard M. Rinehart, Chief Pilot of the Dayton-Wright Airplane Company, of Dayton, Ohio, stating that Dayton would make an entry for the International Aviation Trophy Contest which is to be held in France in Sep-

Dayton, the Birthplace of the Aeroplane, will therefore assist America in competing for the honors in the classic Interna-tional event, and for the trophy which, although won twice out of five times by the United States, will go to France perma-nently if won by that country again this year. The type of aeroplane to be entered by the Dayton-Wright Airplane Company is kept a secret, but it is understood to be

the latest creation of Orville Wright, the Father of Flight, who with his brother, Wilbur Wright, designed and built the first successful aeroplane, which made its first flight sixteen years ago. It is also understood that Howard M. Rinehart, who is a veteran American aviator and has been flying Wright aeroplanes for close to ten years, will be the pilot of this international racer. Mr. Rinehart is a conservative and most successful pilot with exceptionally vast knowledge of aeroplanes and motors and the science of aero-mechanics in general.

This makes the second entry for the Gorden Bennett Trophy, This makes the second entry for the Gorden Bennett Tropny, the first having been made by the Aero Club of Texas, one of the directors of which, Mr. E. E. J. Cox, has stated that he will spend \$100,000 if necessary to win the International Aviation Trophy for America. The type of aeroplane which the Aero Club of Texas will enter is also kept a secret, but it has been announced that a speed of 200 miles an hour is aimed at so as to have the speediest aeroplane in the world. While developing such great speed every attention is also being paid to veloping such great speed every attention is also being paid to developing a slow landing speed, thereby combining safety in landing with the great value of high speed of travel through

The Aero Club of America, being the American representative of the International Aeronautic Federation, under whose auspices the International Aviation Trophy Race is being conducted, must select three entries for this competition. Therefore, one more entry will be selected in the near future, which will be done after hearing from the 49 affiliated aero clubs and the aircraft manufacturers to whom the Aero Club of America has written, requesting to be advised whether they wished to make entries.

## KING ALBERT CHALLENGE TROPHY, \$100,000 IN PRIZES AND POSSIBLE LARGE ORDERS FOR SEAPLANES OPEN TO AMERICAN MANUFACTURERS AND AVIATORS

HE Aero Club of America announces that King Albert of Belgium has offered a challenge cup for aeroplane competition with \$100,000 in prizes which is open to American aviators holding the international pilot certificate issued in the United States by the Aero Club of America.

The contest for the King Albert Challenge Seaplane Cup and \$100,000 in prizes is to be held at Antwerp in July.

The contest is open to two classes of seaplanes as follows:

The contest is open to two classes of seaplanes as follows:

(a) High speed single engined machines, speed at least 110 kilometers an hour with dual control and two pilots, and capable of doing 600 kilometers without landing and carrying at least two passengers with 150 grams of ballast.

(b) Transport machines, multi-engined, minimum speed all out at least 110 kilos an hour, carrying at least 200 kilos and dead weight, six passengers, and at least 600 kilos of baggage, two pilots, and it must be possible to start the matters for the

two pilots, and it must be possible to start the motors from the fuselage. There are three trials to start with:

fuselage. There are three trials to start with:

No. 1.—Endurance trial. Open to competitors of both classes to do as many trips as possible in three days, of 600 kilometers each, without landing, on a circuit from Antwerp, Thames Doel, and back to Antwerp. Fuel can only be taken on board after each completed flight and only if the machine is on

No. 2.—Speed test open to both classes. Classification by the mean speed of three of the same circuit as for the endurance

No. 3.—Trial for security in flight and on the water, open to both classes. The classification will be taken by (a) the time taken to start the motors from on board; (b) the time to unstick with full load; (c) rate of climb; (d) maximum height; (e) navigation and flotation; (f) anchoring and coming alongside; (g) saving the personnel by means carried on the machine, the seaplane being on the water.

The maximum points allowed for (b) to (g) are as follows: (b), 5 points; (c), 15 points; (d), 5 points; (e), 10 points; (f), 5 points; (g), 10 points.

No. 4.—Trials for Colonial work. (a) General contest for Colonial seaplanes of the first class. Classification according to the total points obtained in the endurance, speed and safety trials. To compete for these tests the machines must have No. 3.—Trial for security in flight and on the water, open to

to the total points obtained in the endurance, speed and safety trials. To compete for these tests the machines must have arrived at Antwerp by air. (b) General tests for machines in the second class. The same conditions as for (a) with the additional clause that the seaplane must do at least 150 kilometers an hour with one of the motors cut out. It is anticipated that the prizes will be at least three 50,000 francs for each class, and in addition the winner of the first class will have 150,000 francs, and the second class 250,000 francs. The have 150,000 francs, and the second class 250,000 francs. The winner of the first test will have the F. Jacobs' cup and the winner of the second class will have the King Albert I Challenge Cup.

The winning machines will be bought, and it is possible that a good order will follow from the Belgian Government.

# REPORT OF LATEST CONGRESSIONAL INVESTIGATION OF BILLION DOLLAR AIRCRAFT EXPENDITURES

Approximately ten thousand printed pages are covered by the minutes of the hearings of the latest Congressional investigations of the military aircraft expenditures, which totalled to over one billion dollars since 1917. It is not surprising, therefore, that the Congressional Committees find it hard to make an adequate report of the situation in less than prising, therefore, that the Congressional Committees find it hard to make an adequate report of the situation in less than two hundred printed pages. Affile Age is likewise limited by the amount of space available and will be forced to publish only a comprehensive digest of the hearings and conclusions of this latest Congressional investigation of aircraft expendi-

The reports of the Frear Committee will be printed first, in full. As regards the Manufacturers Aircraft Association, this Committee found conditions to be identical with the conditions found by the Senate Investigating Committee summarized in Aerial Age for February 9th and 16th and by Mr. Hughes in his 1918 investigation.

This investigation does not, however, cover the charges of lobbying and other recent alleged pernicious activities of some misguided individuals who have turned Congress against the Aeronautical Movement by their ill-advised actions.

#### Expenditure in the War Department-Aviation

Mr. Graham, of Illinois, from the Select Committee on Expenditures in the War Department, submitted the following

Subcommittee No. 1, on Aviation, of the Select Committee on Expenditures in the War Department, and composed of Hon. James A. Frear, chairman, and Hon. Walter W. Magee and Hon. Clarence F. Lea, were given the following jurisdiction by said select committee:

This subcommittee will have jurisdiction over all expenditures and contracts of the Signal Corps and for aviation generally, whether such supplies were purchased or contracts made by the Signal Corps or by any other subsequently organized bureau or division of the Army. This will include all aviation expenditures in the United States and until the supplies for which such expenditures are made are landed in foreign countries. By arrangement between Subcommittees No. 1 and No. 3 this subcommittee may make investigations in its work as to activities in foreign countries.

foreign countries.

Included in the work of this subcommittee will be the Spruce Production Division and all aviation fields of the Military Establishment of every kind, with their supplies and equipment.

Since its appointment, on June 17, 1919, the subcommittee has been investigating the various matters submitted to it and has taken a very great volume of testimony, which will be found in the printed hearings of the committee, pages 1 to 3880, serial 2.

On February 9, 1920, the said subcommittee presented its report to said select committee, which, on motion, has been adopted as the report of said committee and is as follows,

adopted as the report of said committee and is as follows, to wit:

The Select Committee on Expenditures in the War Department was directed by House resolution of June 4, 1919, to investigate all contracts and expenditures made by the War Department, or under its direction, during the war. Pursuant to such resolution the committee of 15 members therein provided divided the work among five subcommittees, of which "Subcommittee No. 1 (Aviation)," consisting of James A. Frear, chairman, Walter W. Magee, and Clarence F. Lea, were given jurisdiction over all expenditures and contracts of the Signal Corps and of aviation.

The following summary includes a review of the investiga-

The following summary includes a review of the investigation hearings, which comprise about 3,900 printed pages:

During our 19 months of war with Germany the American Congress appropriated for Signal Corps and aviation purposes as follows:

The above statement is approximately correct. (Exhibit 9, p. 2856.) During this period expenditures or commitments of over \$1,000,000,000 produced the following machines used by American aviators on the French fighting front: American-built pursuit or combat planes. None
American-built bombing planes. None
American-built observation planes (I). H. 4's) 213
Machines bought from our allies. 527

These facts confronted the committee at the outset of this investigation and whatever explanations or excuses may be of prospective quantity production, the fact remains that while the American Congress and the people gave ungrudgingly and were beguiled by responsible officials with promises of 20,000 American aeroplanes that were to precede our American armies to France, when the armistice was signed over 2,000,000 American soldiers had reached France and turned defeat into victory, while America's fighting aeroplane expectations and promises existed only on paper.

Three thousand American aviators available for flying

were in readiness on the front in August, 1918, but fighting planes were not to be had, according to testimony of Gen. Kenly, Director of Aviation and an experienced aviator

(p. 3494).

The number of American flyers on November 11, 1918, was 11,425, of whom 4,307 were in Europe and 7,118 in the United

Testimony, October 31, 1919, before the Joint Military Committee briefly gives the story of America's aviation record from a witness of ecknowledged authority:

Senator Chamberlain. Did you at any time have enough planes of my make of American or foreign to train that body [aviators then in

earings).

\* \* \* \* \*

Mr. James. How many American fighting planes were there in France the signing of the armistice?

Gen. Pershing. None. We had the De Haviland 4s.

\* \* \* \*

Mr. Miller. I mean combat planes. Gen. Pershing. No cambat planes.

Mr. Kearns. Do you know the reason why there were no other American-made planes over there?

Gen. Pershing. I know very little of the construction program in America nor the reasons why we had no further planes. The only reason that I can give is that there were no planes ready to ship (p. 1611, joint military hearings).

Bearing on the same question Col. Patrick, Chief of Air Service, A. E. F., in August, 1918, testified:

Mr. Frear. Two thousand seven hundred and twenty machines were necessary for 1,000,000 men (or 3,400 machines for American forces at the front)?

Col. Patrick. That would be it, approximately.

Mr. Frear. So we were woefully weak in our own Air Service, both in machines and men?
Col. Patrick. Yes, sir (p. 187).

Our utter failure to produce fighting planes after 19 months of war is disclosed by one question:

Mr. MAGEE. As far as the manufacture of pursuit planes or bombing planes in the United States is concerned, we are practically in the same position (August, 1919) we were in when we entered the World War?

Col. PATRICK. Quite true (p. 232).

That, in brief, is the story of America's aircraft production failure, occasioned by a record of stupidity and stubbornness that involved inexcusable waste of men and money and invited military disaster.

The details would fill volumes, but this committee can only point out briefly recognized causes, as set forth in this and previous investigations and, so far as possible, fix responsi-

bility for the record made.

War means waste and extravagance and, unless expenditures are of a questionable character, criticism does not ordinarily follow. Where incompetence, inexperience, blundering, or personal interests were permitted to delay or thwart aviation production and thereby jeopardize the win-ning of the war with attendant unnecessary loss of lives, responsibility should be placed upon those in actual authority. Your committee presents what are believed to be the facts in the firm hope that the Government may profit from errors of the past. Apologists can offer their own explanations.

The members of this committee were appointed without solicitation, but influenced by a unanimous vote of the House they accepted the assignment from a sense of public duty. Notwithstanding propaganda of a political character designed to discredit and interfere, begun before a single witness had been called, the hearings covering testimony of over 100 witnesses tell the story, and this brief report is offered without conscious prejudice, political or personal.

#### Scope of the Investigation

Several years' time and an expensive audit would be necessary to complete an investigation of all aircraft expenditures and commitments. About 700 contracts of over \$100,000 each for aviation are set forth from pages 286 to 336 of the record. Some of these contracts severally involve millions of dollars and numerous contracts were canceled before completion. Thousands of small contracts also were made for aviation purposes during the war, so that a mere statement of the situation will indicate the narrow scope necessarily followed in any practical congressional investigation directed by the House.

Numerous business and military organizations connected with aircraft production were found broken up and scattered many months before this committee was appointed, thereby preventing the location of certain disinterested witnesses on important matters. It was, therefore, deemed the proper function of this committee to ascertain, if possible, what aircraft was secured after an expenditure of more than \$1,000,000,000. If failure to produce results occurred, then to learn why and who were responsible. If undue waste or specific fraud was discovered, to fix responsibility so for as possible, leaving to the proper legal branch of the Government the decision as to the character and weight of evidence produced affecting civil liability and fraud.

# Types of Planes in Use After Two and One-half Years of European War

England, France, Italy, and Germany produced many thousands of combat planes of numerous types prior to our entry into the war, including the English De Haviland, the Spad, the Caproni, the Albatross, and German Fokker.

Improvements in planes were continual, but at the end of the war the above types, including the Spad and Caproni, were as valuable as at the beginning of the war, while two and one-half years of world war, prior to our entry, had emphasized the fact that speed in production of planes then in use was of supreme importance. Perfection in aeroplanes, battle ships, machine guns, or rifles was impossible, and if conditions and weapons were nearly equal, victory followed those who got there first and in sufficient numbers.

This truism of war is mentioned because no excuse can be offered for our pitiful failure to prepare prior to our entry into the war.

# The "Utterly Unsafe" De Haviland 4 Plane Known as the "Flaming Coffin"

The only American plane that ever was used at the front—the De Haviland 4—was not a combat plane and was exceptionally dangerous to pilots and observers because of its defective construction. This fact and the general estimate of the De Haviland 4 is set forth in the testimony of Gen. Mitchell, in command of American aviation in France (pp. 2823, 2845), Maj. Muhlenberg (pp. 194-195), Col. Clark (p. 191), Rickenbacker (pp. 197-198), Eastman (p. 2391), Archibald, of the "Suicide Club" (pp. 1177-1179), Maj. LaGuardia (pp. 144-146), Maj. Meissner (p. 3629), Maj. Foulois (p. 368), Capt. Dissette (p. 2724), Capt. Heisen (pp. 2449-2452), and other reputable flyers or experts, including also many who appeared before the Thomas Senate committee (p. 34), and corroborated by Gen. Pershing's cablegram (p. 203).

A specific indictment against the De Haviland 4, that speaks

A specific indictment against the De Haviland 4, that speaks for itself, was presented by the recent transcontinental race (October, 1919). Gen. Mitchell reported (part 31—concluded, p. 148, committee hearings) that 73 aeroplanes of different types were in that race and that 10 aviators were killed. The following table is self-explanatory:

October, 1919, military transcontinental aeroplane race.

Ceroter, 1919, million y transcontinental	acropiane	76000.
1	Number of planes	Men killed
Unconverted De Haviland-4's Unconverted D. H. 4's and miscellaneous planes		9
Total	73	10

Nine expert aviators in 39 unconverted DH-4's were killed during less than 60 hours of flying. This tragic record in time of peace does not tell the whole story, because many of the 39 unconverted DH-4's, apart from those in which the nine aviators were killed, were wrecked or disabled and would have been captured if in enemy country.

A bullet penetrating the unprotected gas tank of a DH-4

plane would set the plane on fire, leaving slight chance for any pilot or observers, but that kind of plane was the only one of American make that we gave our aviators with which to fight the Germans.

On page 556b of the hearings a statement submitted by Gen. Menoher, present Chief of Air Service, shows that the battle fatalities, for hours flown, of American aviators were three times as great as either the British or Belgian. The statement follows:

Buttle fatalities—pilots only.

Nationality	Period	Hours flown	Fatalities	Average per cent of fatalities to pilots in the field
British. Belgian. American Expeditionary Forces.	July-Oct., 1918 1914-1918 March-Nov., 1918	255,842 40,000 35,747	248 43 106	3.2 (*) 7.74

\*No data.

American aviation statistics also disclose that in proportion to the number engaged five times as many American flyers were killed, compared with officers of all other branches of the service, and accidents to aviation officers, in round numbers, were fifty times as great. At the signing of the armistice 740 planes were in use on the front by American aviators and 236 officers had been killed in battle, or more than double the number given by Gen. Menoher in preceding table and a large 'proportionate increase in fatalities compared with above-named countries.

(From Air Service News Letter No. 7, p. 12.)

Officers	Overseas	Deaths by battle	by ac-		Death rate per 1,000 who served overseas			
			cident	cident	Battle	Accident	Total	
Flying All others		236 2,001	296 139	532 2,140	54.6 20.7	68.5	126.1 22.1	
Totals	100,802	2,237	435	2,672	22.2	4.3	26.5	

#### Findings of Other Investigators

After several months of indecision, confusion, and failure to get results in aviation, following our entry into the war, Gutzon J. Del. Borglum made public certain specific charges of incompetence or worse against responsible aviation officials and he was given letters of authority from President Wilson to fully investigate conditions. H. Snowden Marshall, of New York, also made a report that in substance agreed with Borglum's charges, and the Providence Journal, which made many independent and valuable investigations during the war, disclosed waste, inefficiency, and indefensible delay in aircraft production that challenged public attention and compelled official notice.

Early in 1918 Justice Charles E. Hughes was commissioned to make a thorough investigation of the entire subject at the personal request of President Wilson. Seventeen thousand pages of type-written testimony were taken by Justice Hughes and Attorney Meier Steinbrink, who were engaged five months in the probe, acting with the cooperation and constant attendance of the Attorney General or his assistant. The Hughes report made in October, 1918, of nearly 200 printed pages, was confirmed in all essential particulars by the Attorney General. The Hughes hearings reached every phase of aircraft management and production and it is worthy of note that neither Justice Hughes nor Mr. Steinbrink would accept any remuneration from the Government for their extended service to the country.

Many evidences of incompetence and worse disclosed by the Hughes report are summed up in Justice Hughes' statement:

The defective organization of the work of aircraft production and the serious lack of competent direction of that work by the responsible officers of the Signal Corps to which the delays and waste were chieffy due, were matters for administrative correction through unification of effort under competent control. The provisions of the criminal statutes do not reach inefficiency (p. 3806).

Justice Hughes was primarily investigating charges of alleged criminality against responsible officials and neither his jurisdiction nor that of Congress could reach inefficiency which occurred through administrative laxity.

(To be continued)



# THE NEWS OF THE WEEK



#### The Late Rear Admiral Robert E. Peary

Rear Admiral Robert E. Peary, discoverer of the North Pole, enthusiastic supporter of all aeronautic progress, died at his Washington home on February 20th, after an illness which has intermittently affected him for the last three

The funeral, with full naval honors, was in Washington on February 23rd.

The honorary pallbearers were Vice President Marshall, M. Jules Jusserand, French ambassador; Chief Justice Edward D. White, Supreme Court of the United States; Frederic H. Gillett, Speak er of the House; Secretary Daniels of the Navy Department; Franklin K. Lane, the Navy Department; Franklin K. Lane, Secretary of the Interior; Assistant Secretary Roosevelt of the Navy Department, Admiral Colby M. Chester, Rear Admiral M. T. Endicott, Rear Admiral C. W. Parks, Justice Wendell P. Stafford of the District Supreme Court, J. Hampton Moore, former member of Congress and mayor of Philadelphia: Representaand mayor of Philadelphia; Representa-tive Simeon D. Fess; Col. David L. Brainard; Gilbert Grosyenor, president Brainard; Gilbert Grosvenor, president of the National Geographic Society; Dr. Alexander Graham Bell, Henry G. Bryant, of the Philadelphia Geographic Society; Henry Fairfax Osborne; Alan R. Hawley, former president of the Aero Club of America; Herbert L. Bridgman, Henry A. Wise Wood, Henry Woodhouse, Capt. Robert A. Bartlett, Vilhjalmur Steffanson and Donald McMillan.

#### British Air Chief Coming

Major-General Sir Frederick Sykes, controller of civil aviation in the British Air Ministry, is coming to this country and will outline England's commercial aviation policy to engineers and manufacturers of the United States at the aeronautic exposition which starts March 6 in the Seventy-first Regiment Armory.

#### . Veteran Pilot Plans Pacific Flight

Whitney Warren, veteran aviator, is to meet Thomas Ince and William Fox to arrange for a trans-Pacific aerial flight. Mr. Warren and Jack Moss plan to make a flight from Los Angeles to Sydney, Australia, as soon as the details of the

Australia, as soon as trip can be agreed on.

Mr. Warren recently arrived from Poland where he fought in the Polish poland where the Bolsheviki. During the army against the Bolsheviki. During the world's war he was with the LaFayette Escadrille. At the close of hostilities he went to Fiume and until last September was with D'Annunzio.

Cameramen Get Pictures of Volcano From Aeroplane

Two cameramen obtained views of a volcano in action from aeroplanes that swept within a few feet of the smoking crater. The pictures, the first of their kind ever taken are a valuable contribution to the highly interesting history that has resulted through using the motion picture camera in the aeroplane.

The views were taken over Mt. Lassen, Cal., by Bertin E. Moisant and H. H. Morris, Fox News cameramen. They set out in two De Haviland 4s, piloted by Lieuts. Carlyle Ridenour and Eugene Battan, U. S. Army, from Mather Field, Sacramento, Cal. Mt. Lassen is 250 miles from Sacramento and is in a country difficult of access by ordinary means.

Arriving at the mountain the aviators piloted their machines about the volcanic peak for more than an hour, continually circling about the crater and diving down into it. To enable Moisant to get a fine "close-up", Lieut. Ridenour plunged toward the peak and flattened out when only a few feet above the summit.

Personal Pars

Mr. Harold McGill Davis, Manager of the Advertising Department of the Sprague Electric Works of General Electric Company for the last twenty-one years, died recently.

#### Start Aerial Photographic Department

As the result of interest manifested in aerial views and demands for air pictures made by magazines, newspapers, and business firms, the Curtiss Aeroplane and Motor Corporation has established a Department of Aerial Photography to take

up the regular work of making views from the air.

The new department is a branch of the Department of Operation the assistant chief of which is C. S. Jones. The immediate management of the department will be under Capt. J. A. Morrell, formerly of the Royal Air Forces.

Lieut. Belloni, Aviator, Dies Lieut. Leopoldo Belloni, formerly an officer in the Royal Italian Flying Corps and a member of the engineering corps of his army, for the last several months United States representative of the Caproni Aeroplane Company, died of pneu-monia at the Ritz-Carlton Hotel, New York City, after fourteen days' illness. Lieut. Belloni came to this country two years ago as representative for the Ca-proni Brothers and since that time had made his home at the Ritz.

Flying Boat Makes Record Trip
The ease with which the flying boat outspeeds the fastest express trains by two miles to one was demonstrated recently when an Aeromarine plane carried I. M. Uppercu from Daytona to Palm Beach, Fla., and back in six hours. The fastest express requires twelve hours and twentyfive minutes for the return trip.

five minutes for the return trip.

Mr. Uppercu, who is president of the Detroit Cadillac Company of New York, and the Aeromarine Plane and Motor Company of Keyport, N. J., went to Florida for a few weeks accompanied by C. J. Zimmermann, Chief Test Pilot of the Aeromarine Company and a 40 "L" Flying Boat. On February 9th a flying trip to Palm Beach, 190 miles away, and return, was successfully made. return, was successfully made.

The speed, 63 miles an hour, is not remarkable, but even at this cruising speed the round trip was covered in less time than the train could travel one way.

Mail Aeroplane With Skids

The aerial mail service was resumed between Heller Field, Newark, and Washington. A plane left for Washing-ton equipped with skids instead of wheels for landing gear. An attempt will be made to resume the service from Heller Field to Cleveland.



© Underwood & Underwood
The Butterfly Monoplane, designed by J. L. Cato and manufactured by the L. W. F. Engineering Corporation. Capt. Jack Foote recently gave
the machine its first flight test



#### New Oklahoma Company

The Ponca Aerial Transportation Company has been organized in Ponca City, Oklahoma, and it is planned to inaugurate aerial passenger lines this spring. The company is now negotiating the purchase of a Curtiss "Eagle" which will be used in passenger work from St. Louis to San Antonio.

#### Montreal Company Formed

Aerial Navigation & Agencies (Reg.) of Montreal, announces that it will commence commercial aeronautic activities early in May. The management is ready to undertake forestry survey, forest fire patrol, photography, advertising, police duty, and exhibition engagements.

#### Seek Aircraft Data

Lloyd's, the marine registry and insurance organization, has asked its agents throughout the world to forward data on aircraft just as they have sent data regarding shipping in the past, Balfour Guthrie and Company, Lloyd's Puget Sound agents, announced recently.

#### New Gyroscopic Turn Indicator

A test was recently made on the Sperry Gyroscopic Turn Indicator for Cloud and Fog flying by Training and Operation Group.

The instrument is a light gyroscope operated at a speed of approximately 2,300 revolutions per minute by a Venturi, capable of varying degrees of sensitiveness by the operation of a thumb screw to vary the effectiveness of the Venturi.

As placed in the DH-4 Liberty plane on this test, it appears as a circular dial of three inches in diameter on the dash, having a disc which rotates to lay bare the white portion of itself on the port or starboard application of rudder; for example, should the machine tend to turn to the

right, the white portion of the disc is laid bare on the left, calling for the applica-tion of left rudder immediately by the pilot, and vice versa.

The instrument is a light gyroscope tion with the compass for keeping the pilot on a dead straight bearing, irrespective of fog and defects in rigging of the plane itself. This instrument fulfills the function of revealing quickly any turn the machine makes.

The application of the rudder must be made instantly the variation appears. If it is allowed to continue more than four or five seconds on its wrong course the gyroscope is apt to assume a new bearing which will not be apparent to the pilot until he glances at the compass. Besides precaution of applying the rudder quickly, the pilot must, in addition, use this instrument in conjunction with his compass.

#### Seaplanes to Aid Fishermen

San Diego, Cal.—Night patrols by sea-planes from the naval air station on North Island to aid local fishermen will be attempted in a few days. Daytime patrols to "spot" schools of fish have been in operation for several weeks, and have met with great success. The fishermen hope that even better results will be obtained by the night patrols.

The seaplanes will be equipped with flashes on their wing tips to assist the pilots in making safe landing. A huge searchlight on North Island will throw beams skyward to enable the pilots to navigate home.

#### Tucson, Arizona, Has Landing Field

A municipal aviation field has been located at Tucson, Arizona, and named Macaulay Field.

The field is of rectangular shape, 2,000 feet long and 1,800 feet wide. A 100-foot

concrete circle, and the license number, AR-49, are used as markers. The field is nearly level, well drained and of firm surface.

The Tucson City Aviation Committee located the field, and it is open to all pilots. The Arizona Aviation Co. plans to locate there.

#### "Baby Aeroplane" a Success

While many aeroplane inventors have been devoting their time to making bigger planes, Clarence Prest has been developing and perfecting a small aeroplane.

He perfected what is said to be the smallest aeroplane in the world, and in its initial flight at Ince Aviation Field, at Venice, Cal., demonstrated its entire prac-Mr. Prest, has an 18-foot span, length over all is 14½ feet, and the weight when empty is 625 pounds. The machine has a carrying capacity of 300 pounds, besides pilot and fuel for one hour. The speed is a trifle over 100 miles per hour, and low speed 45 miles. The plane is equipped with a seven-cylinder, 50-h.p. Rotary (Gyro) motor. It gets off in 100 feet.

Prest, the inventor, is a demonstrator and designer for the Crawford Aeroplane

#### Aviation School at Long Beach, Cal.

Earl S. Daugherty, one of the veteran pilots, flying since 1911, has opened the Chateau Thierry Flying Field at Long Beach, California, and the venture is proving very successful.

He is operating the Daugherty School of Aviation and also doing passenger-carrying work. The total passengers carried so far is over 3,200.

During the war, aviator Daugherty served with the U. S. Air Service and he has had over 2,500 hours flying time.



© Wide World Photos

The Thomas-Morse twin-motored Trans-Continental Aerial Mail Plane which recently had its first flight tests

### CABLE LENGTHS AND FITTING ANGLES

#### By NORMAN L. KEARNEY

CABLE AND STRUT LENGTHS

THE task of calculating accurate lengths for struts and cables, and the proper bending angles of the fittings for same, usually leads into a greater complication of figures and data than the final results would indicate. It is, therefore, advisable to adopt some systematic method of recording the work as it progresses and thus make the checking of results an easy matter.

It will be apparent that the use of the methods herein described is not limited to the work under discussion, but may be used in the design and detailing of any complicated machine. In this article the fittings, struts and cables of the

wings only will be used.

It is first necessary to compute the locations in three direc-tions of all station points, and to put this information in such form as will be readily accessible. It is customary to call the center point of the spar, at each compression rib, a station

The usual procedure is to lay out a scale drawing in three views with these locations figured with dimension lines and perhaps notes. The objection to this method is that it is impractical to give direct figures between all station points and refiguring is therefore necessary when this information is

The following system of co-ordinates for establishing loca-

The following system of co-ordinates for establishing location points throughout the ship, similar to the surveyor's method of fixing bench marks and the architect's scheme of establishing floor levels, etc., in relation to the ground floor or other datum plane, has been used by the writer, both for the work outlined above and as a permanent reference for discovering locations and distances for any purpose whatever. First, an outline diagram large enough to indicate station points is made, as in Fig. 1. Then each of these station points (at least those having external wire or strut connections, as here shown) is located with reference to three datum planes. It will usually be found convenient to consider a horizontal plane through the center of the crank shaft of the motor as the Vertical Datum and to call this Elev. 100 inches or H-100. For example:—If a point under consideration is 12 inches above the center line of crank shaft, its elevation would be

For example:—If a point under consideration is 12 inches above the center line of crank shaft, its elevation would be H-12", if 12" below this datum, it would be H-88".

In the same manner a-Vertical plane through the center line of the motor and perpendicular to the longitudinal axis is the Longitudinal Datum (L-100") and a Vertical plane through the center line of the ship is the Lateral Datum (W-00").

The upper table, Fig. 2, gives the location of station points in this manner. It is hardly necessary to state that all conditions of dihedral incidence, etc., must be taken into conditions.

in this manner. It is hardly necessary to state that all conditions of dihedral, incidence, etc., must be taken into consideration in establishing these locations.

Now each station that has a cable or strut connection should be detailed (as in Fig. 4) sufficiently to establish the location of some point on the center line of cable or strut from which figures can be taken. It is unfortunate that practical conditions often make it impossible for the center lines of cables, spars and struts to intersect at the same point. It is, therefore, usually necessary to establish a point of intersection for each cable and strut at the surface of the spar or other convenient plane.

In Fig. 4, we have the location of center of spar at Station 125, as recorded in upper table, Fig. 2. From this point we find the location of point X by drawing to scale the spar and fit-The Dihedral Angle  $\phi$  and the angle  $\theta$ , (the deviation of base of fitting from the horizontal) must, of course, have been

determined previously. The angles  $\alpha$  and  $\beta$  can be approximated accurately enough for the present purpose. When all stations have been so detailed and points established, this data is assembled in condensed form as shown in the lower table, Fig. 2.

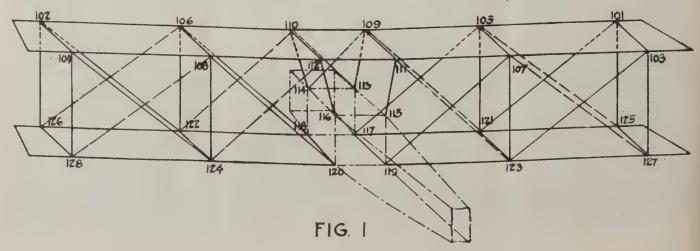
It is then a simple matter to calculate the distance between the two points X on any wire or strut, by subtracting the

TABLE OF LOCATIONS OF WING FITTINGS.  DATUM H (HEIGHT) A HORIZONTAL PLANE THEW & OF CRANK SHAFT - H-100.00°.  LIENGTH A VERTICAL PLANE THEW & OF MOTOR - L-100.00°.  W (WIDTH) A VERTICAL PLANE THEW LONG AXIS OF SHIP - W-0.00°.										
LOCATIONS AT CENTER OF SPARS ~ (113-114-115-116 ARE LOCATED ON GENTER OF LONGERON)										
STAT	ION.	H	L	W	STA	TION	Н		W	
101 AF	w 102.	139.009	129.645	156-247	115-	ND116	108.125	164645	15.00	
103 -	104	137.634	156965	156.247	117	- 118	81.268	140,576	15.565	
105.	106	137.747	129645	84.135	119	- 170	79.893	167.896	15.565	
107 -	108	/36372	156965	84.135	171	. 122	82.468	140.576	84.135	
109.	110	136.754	129645	27.375	123	- 124	81.093	167.896	84.135	
111.	117.	/35.379	156.965	27.375	125	- 126	83.73	140.576	156.247	
113.	. 114.	108.125	121.632	15.00	127	. 128	82.355	167.896	156-247	
		LOC	LATI(	ONS I	AT ,~,	POIN	IT "X	•		
				ON5	AT Y	POIN	IT "X	-		
STA.	PULL TO	and the second	ATI(	ON 5	T,	<u> </u>	IT "X	-	W	
5TA.	PULL TO	and the second	L 129.725	,	T,	· ·		140.450	W 16.465	
5TA. 101 103		H		W	SIA	PULL TO	н			
101	121	H /37:215	L  29.725	W 154404	51A 117	PULL TO	H 82.987	140.450	16465	
101	121	H 137.215 135.913	L 123.725 154.855	W 154.404 154.482	51A 117 119	PULL TO 105	H 82.987 81.606	14a450 167696	16.457	
101	121 123 125	H 137.215 135.913 136.137	L 122,725 154,855 122,725	W 154404 154.482 84.762	5TA 117 119 121	PULL TO 105 107 109	H 82.981 81.606 84.098	140.458 167.696 140.458	16.465 16.457 87.315	
101 103 105	121 123 125 117	H 137.215 135.913 196.137	L  Z2725  156855  122725  129725	W 154404 154.482 84.762 82.792	5TA 117 119 121	PULL TO 105 107 109 101	H 82.987 81.606 84.098 84.109	140.458 167.696 140.458 140.458	16.465 16.457 82.315 84.735	
101 103 105	121 123 125 117 119	H 137.215 135.913 136.137 136.139	123.725 154.855 122.725 122.725 154.855	W 154404 154.482 84.762 82.292 82.285	5TA 117 119 121 "123	PULL TO 105 107 109 101 111	H 82.987 81.606 84.098 84.109 82.738	140.458 167.696 140.458 140.458	16.465 16.457 82.315 84.735 82.235	
101 103 105  107	121 123 125 117 119 127	H 137.215 435.913 136.137 136.139 134.640 134.766	L 122725 154855 122725 122725 154855 154855	W 154404 154402 84.762 82.292 82.205 84.744	5TA 117 119 121 "123	PULL TO 105 107 109 101 111 103	H 82.987 81.606 84.098 84.109 82.738 82.815	140.458 1676.96 140.458 140.458 167.696 167.696	16.465 16.457 82.315 84.735 82.235 84.725	
101 103 105  107	121 123 125 117 119 127 114	H 137.215 135.913 134.137 134.640 134.766 135.076	122725 154855 122725 129725 154855 154855 154855 129725	W 154404 154482 84.762 02.792 87.285 84.744 Z6873	STA 117 119 121 "123	PULL TO 105 107 109 101 111 103 105	H 82.987 81.666 84.098 82.738 82.815 85.360	140.458 1676.96 140.458 140.458 167.696 140.458	16.465 16.457 87.315 84.735 82.235 84.725 154.309	
101 103 105  107 	121 123 125 117 119 127 114	H 137.275 135.913 136.137 136.139 134.640 134.766 135.076 135.076	122725 154855 122725 129725 154855 154855 154855 122725 122725	W 154404 154482 84.762 82.292 82.285 84.744 Z6873 29.124	STA 117 119 121 "123	PULL TO 105 107 109 101 111 103 105	H 82.987 81.666 84.098 82.738 82.815 85.360	140.458 1676.96 140.458 140.458 167.696 140.458	16.465 16.457 87.315 84.735 87.235 84.725 154.309	
101 103 105  107 	121 123 125 117 119 127 114	H 137.275 135.913 136.137 136.139 134.640 134.766 135.076 135.076	122725 154855 122725 129725 154855 154855 154855 122725 122725	W 154404 154482 84.762 82.292 82.285 84.744 Z6873 29.124	STA 117 119 121 "123	PULL TO 105 107 109 101 111 103 105	H 82.987 81.666 84.098 82.738 82.815 85.360	140.458 1676.96 140.458 140.458 167.696 140.458	16.465 16.457 87.315 84.735 87.235 84.725 154.309	

FIG. Z.

smaller location value from the larger in each of the three columns, H, L and W. The three dimensions thus derived are the three sides of a cube whose diagonal is the dimension

Therefore, extract the square root of the sum of the squares of these three dimensions. The result is the distance from X to X along the center line of the cable or strut. From this result subtract Y<sup>1</sup> (Fig. 3) for the fitting at each end of cable or strut. This result is the assembled length required from center to center of clevis pins.



For example:--To find the length of the cable from Station 105 to 125. In lower table, Fig. 3, we have the following "locations":

Sta.	Pull to	H	L	W
105	125	136.157	129.725	84.762
125	105	85.360	140.458	154.309
		50.707	10.722	

Taking the differences in each column, we get the dimensions (D) which are the sides of as imaginary cube.

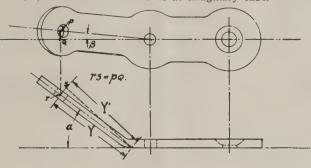


FIG. 3.

 $50.797^{\circ}+10.733^{\circ}+69.547^{\circ}=86.789$ =the distance from point X (Sta. 105) to point X (Sta. 125.) Consider that Y'=1-15/32 at station 105 and 1-19/32 at station 125. Adding these two, we have 3-1/16" to subtract from 86.789" giving 83.727 center to center of clevis pins.

The bending angle ( $\alpha$ , Fig. 3) and the offset angle ( $\beta$ , Fig. 3) must be solved separately for each fitting. The operations necessary are best explained by the use of an example.

In Fig. 4 in each of the three views, locate point X of station 105 at a, b and c, in relation to point X of station 125, at a convenient scale; not necessarily the same scale as used for

a convenient scale; not necessarily the same scale as used for the fitting.

Since the Bending Angle is in a plane perpendicular to the base of the fitting, the subsequent graphic layout must be revolved through the Angle  $\beta$  about the axis kx, making the angle b y m equal to angle  $\beta$  and m y equal to b y. Then m is the new location of point X of station 105.

Draw mf parallel to ky. Draw fx; then fxk or  $\alpha$  is the bending angle sought

bending angle sought.

Make de (in the projected plan view) = m n (in Section M-N).

Draw dz, then dze or  $\beta$ =the offset angle  $\beta$  of Fig. 3. This completes the graphic layout from which the angles equired can be scaled accurately enough for most purposes if the work is done carefully.

However, the most satisfactory way is to figure the angles from this layout, as this gives an accurate check on the lengths

from this layout, as this gives an accurate check on the lengths of cables and struts, as well as insuring perfect fittings. In Fig. 4 we have given, angle  $\beta$ =5° and the Dihedral Angle,  $\phi$ =2°. The distances ag, yl (=ce) and gx (=ez) are known from the lower table of locations (Fig. 2). ag=50.797 and gx=69.547 (from the lower table Fig. 2). gh=69.547 x tan 2° (.03492)=2.429. Therefore, ah=53.226. It is probable that this dimension would have been established before figuring locations. bl=ak=53.226 cos 2°=53.193.

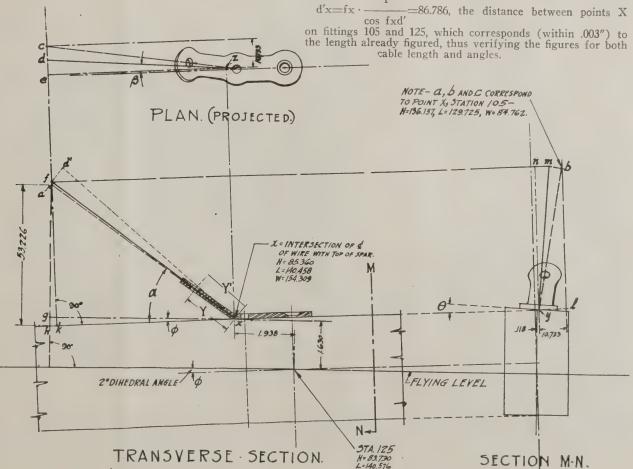
Angle byl=cot 
$$\frac{-1 \text{ yl}}{\text{bl}} = \frac{10.733}{53.193} = 78.59^{\circ}$$
  
my=by=bl  $\cdot \frac{1}{\cos} = \frac{53.193}{.98025} = 54.265$ 

The angle myb was constructed equal to Angle  $\theta=5^{\circ}$  Add this to byl (78.59°) and we have the angle my 1=83.59° and, therefore, my n=6.41°

fk=n y=m y · cos 6.41°=54.265×.99375=53.926 de=m n=m y · sine 6.41°=54.265×.11161=6.057

$$\begin{array}{c} \text{hx=gx} \cdot \frac{1}{\cos 2^{\circ}} = 69.547 \\ \text{hk=53.226} \cdot \sin 2^{\circ} \quad .99939 \\ \text{hk=53.226} \cdot \sin 2^{\circ} \quad (.03490) = 1.858 \\ \text{kx=ez=(hx-hk)} = (69.589-1.858) = 67.731 \\ -1 \text{ fk} \quad 53.926 \\ \text{kx} \quad 67.731 \\ -1 \text{ de} \quad 6.057 \\ \end{array}$$

Offset Angle  $\beta$ =tan—=  $=.08943 = 5.11^{\circ}$ Draw d' f perpendicular to fx, and equal to de; then f x d' is the offset angle in the developed flat pattern.



# AEROPLANE PERFORMANCE

By DAVID YELNIK, M. E., University of Nancy

WO charts are shown the purpose of which is to enable the performance of an aeroplane to be calculated both rapidly and accurately, thus saving a considerable amount of tedious mathematical work, particularly in the earlier design stages, when the possibilities of various power units, loadings, etc., are under dis-cussion and rapid comparisons are de-

The charts have been evolved in the Research Department of the Aircraft Manufacturing Co., and they are based on theoretical considerations of the rela-

W -, loading, head tion ship between -H.P.

resistance, speed, and ceiling of an aero-plane, the principle being similar to Eif-fel's polar logarithmic diagram, but the purpose of the charts is somewhat dif-

Their construction is based on a consideration of the following equations of an aeroplane flying level, where the symbols used are as follows:

W = Weight. p = Density/gravity. S = Wing surface.

= Speed.

 $K_y = Absolute lift coefficient.$  $K_x = Absolute drag coefficient.$ 

A = Head resistance in sq. ft. of normal plane (1 sq. ft. having a resistance of 15.2 lb. at 100 ft. per sec.).

L = Loading. The first two equations are:

 $W = p K_y SV^2 \qquad \dots \qquad (1)$   $H.P. = (p K_x V S^2 + p AV^2) V \qquad (2)$ Assume  $A = {}^a S$ , then equation (2) be-

H.P. =  $p(K_x + a)SV^a$  ... (3 Dividing equation (1) by equation (3), W  $K_y$  1

 $K_y$ H.P.  $K_x+a$ 

W Again, since  $L = \frac{1}{S}$ , equation (1) may

L= $p K_y V^2$  ... (5) Equation (4) and (5) are those which affect the charts fundamentally. Taking logs on both sides of these equations.

 $K_y$  $=\log\left(\frac{1}{K_x+a}\right)$ -log V

where † denotes "complete machine," and  $\log (L) = \log p + \log K_y + 2 \log V$  (7) Equation (6) being derived from equation (4), and equation (7) from equation (5). The charts being constructed for one definite altitude, the density is constant for that altitude, and hence in this area.

for that altitude, and hence in this case log p is constant.

Chart I (Scales I, II, and III)

This chart has been constructed in the following manner:

Two axes X and Y have been drawn at right angles, Ky having been plotted to a

logarithmic scale along the X axis, and -

along the Y axis. The Y axis being scale I and the X axis scale II, scale III, the scale of speed, is inclined at  $e = \tan^{-1}(\frac{1}{2})$ to the X axis as shown on the chart, the ratio 1:2 being the coefficients of log V in equations (6) and (7). At the origin of scale III, which coincides with the origin of scales I and II, the speed is 100 ft. per sec. Now let the Y axis be considered. In equation (6), to each value of W

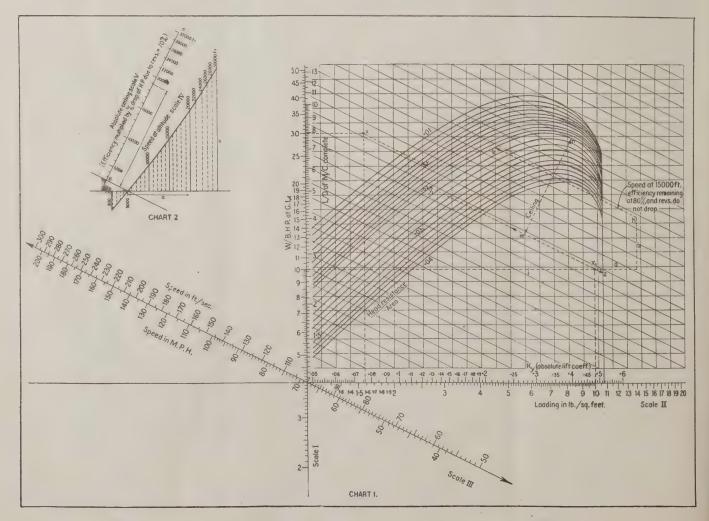
H.P. these - corresponds one value of -D corresponding values having been plotted opposite to each other along the Y axis.

H.P. a constant propeller In calculating -

efficiency of 80% has been assumed, but if in any particular case the efficiency of a propeller under consideration differs W

from 80%, say 75%, then must be H.P.

correct according to the ratio 80:75. Allowance has been made for increase of head resistance due to slip stream. Considering now the X axis, in equation (7) to each value of  $K_y$  corresponds one value of L, these corresponding values being plotted opposite to each other along



the X axis. All the scales have the same value except the speed scale, where the distances measured are in the ratio of

or √5:1, compared with

scales I and II.

The curves for head resistance : area have been calculated by assuming an imaginary aeroplane of constant wing surface but variable head resistance. The calculations are simplified considerably by using the Eiffel polar diagram method. The wing section assumed for these charts is R.A.F. 15, and the machine is assumed to be a biplane (where G/C=1 and aspect radio = 8). The maximum speed at low altitudes would not vary greatly if a different combination were used, but the ceiling and also the speed at high altitudes might vary considerably if an aspect ratio differing widely from 8 were used.

Chart 2 (Scales IV and V)

This chart consist of two scales-IV and V. Scale IV has been constructed for the purpose of calculating the speed of the machine at heights other than 5,000 ft. The a axis represents the density of the air, and the b axis the fall of h.p. with altitude. No account has been taken of the variation of propeller effi-ciency or revolutions according to altitude. This fact should be borne in mind when using this scale IV. The speed at any height is obtained by adding the two vectors a and b as shown on the chart.

Scale V shows the method of obtaining

absolute ceiling. In practice the perpendicular mn is measured on chart 1 from dicular mn is measured on chart I from the top of the head resistance curve to the required dotted line. This length is then read off scale V. In calculating the ceiling in scale V, the propeller efficiency multiplied by the percentage drop of h.p. due to the r.p.m. is assumed to be 70%. This is in contradistinction to scale IV.

The following is the method of calculating the maximium speed at 5000 ft. on

lating the maximium speed at 5,000 ft. on

chart 1:
(1) Draw a horizontal line through (1) D W

- on scale I, the propeller B.H.P. at G.L.

efficiency being 80%.

(2) Draw a vertical line through the loading (scale II).

(3) From the point of intersection of

the above lines draw a straight line par-allel to the speed line (scale III) to meet the required head resistance : area curve. The length of this line, measured from the origin of the chart along scale III, gives the maximum speed at 5,000 ft.

Note.—If the point of intersection of lines (1) and (2) is to the left of head resistance area curve, the length is

measured to the right from the origin on scale III and vice versa. The direction is also indicated on the chart by arrows.

The following five examples are worked out to show clearly the method of oper-

ating the charts:

CASE 1.—To obtain the maximum speed of the machine at 5,000 ft., when Weight —= 30

Brake horse-power at ground level Propeller efficiency = 80%

Loading = 1.59 lb. per sq. ft.

Note.—The figures chosen in this example are not likely to occur in an actual machine.

Draw the horizontal through W

B.H.P. at G.L.

of value 30, and the vertical through loading of value 1.59. These two straight lines intersect at the point x. Through xdraw the straight line xy parallel to the speed scale (scale III) to meet the head resistance ÷ arca curve of value .015 in the point y. Take the length xy and measure it along scale III from the origin to the right, the resultant reading being 77 ft. per sec., or 53 m.p.h.

CASE 2.—To obtain the maximum speed

of the machine at 5,000 ft., when

B.H.P. at G.L.

Propeller efficiency = 80%

Loading = 10 lb. per sq. ft. Draw the horizontal through W

#### B.H.P. at G.L.

of value 10, and the vertical through loador value 10, and the vertical through loading of value 10. These two straight lines intersect in the point  $x_1$ . Through  $x_1$  draw the straight line  $x_1y_1$  parallel to the speed scale (scale III) to meet the head resistance  $\div$  area curve of value .02 in the point  $y_1$ . Take the length  $x_1y_1$ , and measure it along scale III from the origin to the left, giving as the result a speed of the left, giving as the result a speed of 195 ft. per sec., or 133 m.p.h.

CASE 3.—To obtain the maximum speed of the machine at 15,000 ft., assuming pro-

peller efficiency to remain at 80% and the revs. constant, when

W B.H.P. at G.L.

Loading =10 lb. per sq. ft. Draw the horizontal line through

#### B.H.P. at G.L.

of value 10, and the vertical line through the loading of value 10. These two straight lines intersect at the point  $x_1$ . Produce the horizontal through  $x_1$ , a disfrontiee the horizontal through 21, 2 distance equal to the vector a between 5,000 ft. and 15,000 ft., making use of chart 2, scale IV, for this length. Then add the vector b equal to the vector b between 5,000 ft. and 15,000 ft. on scale IV. Hence the point h on chart 1 is now reached. Then from the point h draw the straight line hk parallel to scale III to meet the head resistance  $\div$  area curve of value .02 in the point k.

Take the length hk, and measure it along scale III from the origin to the left, giving as the result a speed of 177 ft. per sec., or 120.5 m.p.h.

CASE 4.-To obtain the minimum speed the machine at 5,000 ft.

This speed depends solely on the loading of the machine. When the loading is 10.7 lb. per sq. ft., the minimum speed is 100 ft. per sec. at 5,000 ft. altitude.

To find the minimum speed at any other loading, say, for example, when the Loading = 10 lb. per sq. ft.,

draw the vertical through this loading of draw the vertical through this loading of value 10. Take any point  $x_1$  on this vertical. Through  $x_1$  draw the straight line  $x_1z$  parallel to scale III to meet the vertical through the loading of value 10.7 in the point z. Measure the length  $x_1z$  along scale III from the origin to the right, giving as the result a speed of 97 ft. per sec. or 66 m.p.h. sec., or 66 m.p.h.

Note.—In calculating minimum speed the distance  $x_{12}$  must be measured from the origin to the right or left along scale III, according as the loading is to the left or right of the 10.7 vertical line. This vertical through loading of 10.7 lb. per sq. ft. is the maximum lift coefficient line.

CASE 5.—To obtain the absolute ceiling.

Construct the straight line  $x_1y_1$  in chart 1 as in Case 2. Then draw the greatest perpendicular mn from the point n on the

head resistance  $\div$  area of value .02 to meet  $x_1y_1$  at the point m. Take the length mn, and measure it along chart 2, scale V; the actual length is indicated by the arrows, so that in this case the ceiling is approximately 18,800 ft.

Note.—The lift coefficient and — can

also be found from chart 1. For example, the vertical from the point y to scale II gives the required value of  $K_y$ , and the horizontal from the point y to scale I

gives the required value of  $\stackrel{}{-}$  of the ma-

chine at this altitude, and so for any other point on the head resistance : area curves. This will be clear if it be remembered that the series of head resistance ÷

area curves have been plotted as against Ky.

#### Boy Mechanics For Royal Air Force

London.—The Air Ministry has recently instituted a new scheme to secure the entry of well-educated boys for a systematic course of training as skilled craftsmen for service with the Royal Air

Under this scheme, boys will be entered between the ages of 15 and 16 years for a period of ten years color service, followed by two years service in the Reserve. During the first three years they will undergo a course of educational and workshop training, at the end of which those who have passed the requisite tests will be promoted forthwith to the rank of Leading Aircraftsmen in one or other of the skilled trades.

To give scope to the more capable and ambitious boys, and to insure that the Air Force shall secure the full benefit of their ability, a certain number of those who show most promise during their training will be chosen for an additional six months' course of higher instruction, being promoted at once to the rank of Corporal. From among these, some may be selected for the grant of a commission, and will proceed to the Cadet College for the property of the cadet College for the property as flying officers with the cadeta. training as flying officers with the cadets entered by open competition.

There will also be opportunities for a promotion to a commission at a later stage to those who show their suitability during their service in the ranks.

In order that the opportunity of competing for entry into the Royal Air Force under these conditions may be brought within the reach of the largest possible number of boys, two distinct methods of admission are being arranged: (1) open competitive examination; (2) examinations limited to candidates nominated as in every way suitable by the Local Education Authority of their district. A limited number of candidates with service claims may also be admitted on the nomination of the Air Council subject to their passing a qualifying test only.

The first examination under the scheme will be one for boys nominated by their Local Education Authority. Full particulars in regard to the arrangements of the grant of nominations for this examination have been circulated to the Local Education Authorities throughout the country, many of whom have already promised their support. Prospective candidates should communicate with their Local Education Authority without delay. Boys who are successful in this examina-tion will enter the Training Centre early in February, 1920.

# THE FAIRCHILD AUTOMATIC AERIAL FILM CAMERA

By HERBERT E. IVES

Major, Aviation Section Signal Officers Reserve Corps, United States Army, lately officer in charge of Experimental Department, Photographic Branch, Air Service

HE Fairchild Automatic Aerial Camera owes its origin to a demand Aerial for certain desirable improvements in the type "K" automatic film camera, adopted by the U. S. Air Service. These consisted of a between-the-lens shutter, film spacing device, and exposure interval

mm spacing device, and exposure interval mechanism. The camera as illustrated is actually a type "K" camera with new parts built upon it or substituted. It is to be understood, therefore, that this single model is a composite, and therefore attention is directed to the distinct tention is directed to the distinctively novel features, which are available for incorporation in new cameras of entirely original de-

Taking up first of all the shutter, as perhaps the most unique feature, it is to be noted that heretofore the only shutter found feasible with the 20-inch focus, F/6 aperture lens (three inches clear opening) was the focal plane design. In this the exposure is made by a narrow slot in a curtain which moves rapidly across the field in front of the sensitive plate. Before the construction of the present shutter no one had succeeded in producing a shutter of the other common type-the between-the-lens variety, of this size of a speed or efficiency even remotely approaching that neces-

Sary in aerial photography.

Certain defects were, however, clearly recognized in the focal plane shutter. One is the distortion of the image which results from its use. How this occurs may be easily grasped when it is may be easily grasped when it is remembered that the shutter curtain may take as much as 1/5 second to travel the whole length of an  $18 \times 24$  centimeter plate. In this fifth of a second an aeroplane traveling 100 miles per hour progresses about 150 feet, consequently the point of view has changed by that much while the exposure is in progress and the

exposure is in progress and the picture will be distorted by the beginning and end being displaced with reference to each other by that amount, whether the distortion will be a compression or expansion, or a warping depending on the relative direction of motion of plane and shutter curtain.

A second defect of the focal plane shutter is uneven speed of travel across the plate. This may amount to 50 per cent. or more, resulting in uneven densities, which are especially undesirable in assembling strip or mosaic maps, and only to be corrected by "dodging" or uneven exposure in printing.

The new between-the-lens shutter consists essentially of five flat steel leaves driven by a powerful helical spring which in making a complete revolution carries the sectors out and in again, opening and closing the lens aperture. The link connection between spring and leaves is such as to make the leaves dwell somewhat

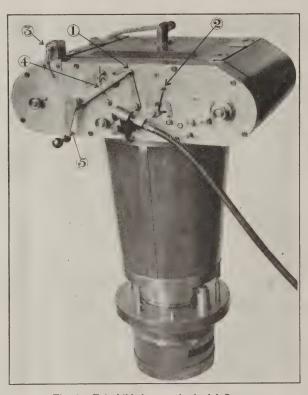


Fig. 1. Fairchild Automatic Aerial Camera Interval pointer which can be set to have the camera operate automatically at any interval between 8 seconds and 120 seconds.

Lever for adjusting shutter speed,
Counter showing number of pictures taken,
Pointer indicating whether or not the shutter is set.
Crank for the hand operation of camera.

at the open position with consequent high efficiency. The speeds (actual, not estimated) range with this shutter from 1/50 to 1/140 second (controlled by an inertia retarding device) with an efficiency throughout this whole range of about 70 per cent. Comparison of this performance with that of other between-the-lens shutters (all of much smaller size) shows the new shutter to be quite in a class by itself for speed and efficiency. This is illustrated by the appended charts. Pictures obtained with this new shutter are free from distortion, and absolutely even in exposure from edge to edge.

The next new feature is the interval timing mechanism. In the "K" type camera the interval between exposures is regulated by a separate device of two friction discs, connected to the camera by a flexible shaft. In the Fairchild camera this control is entirely in the camera mechanism. Variation of the exposure

interval is effected by means of a lever on the outside of the camera body reading on a circular scale (see annoted photograph of entire camera, Fig. 1) similar to an adjacent control for the shutter speed. Exposure intervals may be thus varied over a range of about 15 to 1. With the driving shaft rotating 3,600 R.P.M. the shortest interval is 8 seconds. Control at a distance can be simply arranged for if desired, through bowden wires, the distance control board connections snapping on the interval and shutter speed levers in a few seconds.

The third new feature is the film spacing device. Referring again to the original "K" type camera: in this the space between successive pictures increases as the film goes through, due to the increasing size through, due to the increasing size of the receiving roll, which is rotated uniformly through the same angle. This results in a considerable waste of film. In the Fairchild camera the rotation of the receiving roller is governed by a separate measuring roller, so that exactly the same length of film is moved by after each exposure.

Reference may be made to the accompanying illustration showing a section of film as made in the camera (Fig. 2). This exhibits well the uniformity of density and uniform interval between pictures.

of density and uniform interval between pictures.

The operation of the camera is simple. Motive power is furnished by a 12-volt motor making 3,600 R.P.M., driven either from storage batteries or generator, if the plane is so equipped and connected to the camera by a flexible driving shaft. The 100 exposure film, on its original roll holder, is placed directly in the camera at one end of the camera body proper, the free end being threaded into a receiving roller at the other end. A venturi tube attached to some exposed part of the plane and through a rubber tube to the perforated camera back, produces a suction which holds the film flat. The camera body is quickly removed from the lens cone, for purposes of packing the plane. Flaps have been provided inside the camera body which automatically open when the lens cone is attached and close when the cone is removed, so that no film is spoiled by removal of the camera rom the plane.

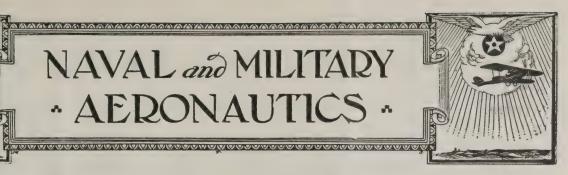
In summarizing the characteristics of this camera, emphasis is again laid on the fact that its novel features consist of certain elements—shutter, interval mechanism and film spacer—which may be incorporated in cameras of a wide variety of design and type of construction. These elements are pre-eminently fitted for use in mapping cameras, and particularly in cameras stabilized by gyroscopic means, in which all forms of distortion must be eliminated if the stabilizing feature is to be of real use.



Print from strip of film taken over Washington showing even spacing and perfect overlap



# NAVAL and MILITARY **AERONAUTICS**



#### "Blimp" C-6 at San Diego

San Diego, Cal.—The first dirigible assembled on the Pacific coast, the C-6, will make its first flight over this city soon. Inflation of the huge gas bag will be started at the North Island naval air station. Lieutenants Roman J. Miller and Ralph Norris have been detailed to pilot the dirigible. Both saw active service with the naval air fliers during the war.

It has been planned to have a fleet of

the big airships based at North Island to do the reconnaissance and training duty with the vessels of the Pacific fleet.

#### Three DVA Albatros Scouts Received at Supply Depot, Richmond, Va.

The Aviation General Supply Depot at Richmond, Virginia, received three latest type German Albatros DVA Scout aeroplanes equipped with the Benz 260 H.P. and 160 H.P. Mercedes engines. planes are part of the allotment received by the United States through the terms of the Armistice.

The DVA Scouts are in good condition and are equipped with two Spandau machine guns, with the latest German synchronizing device for shooting through the propeller. Two separate triggers controlling the firing of these guns are attached to the "joy stick".

The Benz engines are 260 and 200 H.P. respectively, 6 cylinder, vertical type. Both of the engines appear to have been purposely rendered unserviceable. Notwithstanding the damage done, these engines can be repaired. In a short time they will be ready to take the air with American insignia painted.

#### Discharged Officers Granted Flying Rating

Fifteen former second lieutenants in the Air Service, U. S. Army, who had completed their required tests before separation from the Service by honorable dis-charge during 1919, have been granted the charge during 1919, have been granted the rating of reserve military aviator, to date from June 10, 1919. The names of these former officers are Walter T. Bradley, Ralph P. Currie, Hunter A. Dickens, Dorsey E. Kinney, Louis A. Lawson, Frank F. Palmison, John A. Patterson, Ernest E. A. Pratt, Robert S. Rogers, Philip Rozelle, Mark Said, Frank W. Seamans, Mac Short, Victor H. Sinks, George A. Worsham.

#### Air Service Schools to Be Enlarged

In view of the increased facilities for training, the Air Service in the near fu-ture will accept candidates from civil life who desire to take a course of training for aeroplane pilots. The next classes in the heavier-than-air branch will open on or about May 1 at Carlstrom Field and at March Field. The lighter-than-air classes will open soon at the Army balloon will open soon at the Army balloon schools, located at Lee Hall, Va., and Ross Field, Arcadia, Cal. Enlisted men who desire training as flying cadets will be required to submit a signed statement to the

effect that should the applicant be assigned to a class as a flying cadet and should his current enlistment expire during his course of instruction, he will reenlist as a flying cadet (or re-enlist in the Regular Army, if he so prefers). The pay of flying cadets is \$75 a month and

mess allowance is \$1 a day.

The cadets are given a thorough course in all branches, including mechanics and the construction of aeroplanes in the ground schools before they take their ac tual flying training. It is the intention of the Air Service to allow all enlisted men to take flying training. The cadets, men to take flying training. The cadets, upon the completion of their training, are commissioned in the aviation section, nal Reserve Corps, as aeroplane pilots, and are given the preference to either receive their discharge or return to duty as enlisted men, with the privilege of wearing wings.

#### Air Service in Panama Securing Landing **Fields**

The longest reconnaissance flight ever attempted on the Canal Zone was successfully completed when three D.H.-4 planes flew across the Zone and penetrated into the interior on the south coast for a distance of about one hundred miles. The purpose was to find a landing field where a base could be established to carry on work farther up the coast.

The finest landing was at Penonome, where a field had been cleared by the municipal authorities. The planes then proceeded to Aguadulce, about sixteen miles west and here found one of the finest natural landing fields. This field is large and absolutely smooth and level and will be used as a way station for planes operating between this field and the western boundary of the Republic of Panama.

The planes returned to Fort Amador, where they secured a fresh supply of gas and oil and then returned to the Atlantic side of the Zone. The pilots of the planes were Major Wm. O. Ryan, 1st Lieut. Charles B. Austin and 2nd Lieut. Elmer F. Degon. 2nd Lieut, Dayton D. Watson accompanied the flight as photographer and recured excellent photographs

of the towns and landing fields. Major R. C. Prescott a reserve officer and Inspector General of Telegraphs for the Republic of Panama, was a passenger, and his first hand knowledge of the towns greatly assisted in the work.

# Air Service Post American Legion Meets At Aero Club of America

The Air Service Post of the American Legion, which makes the Aero Club of America its headquarters held a meeting at the Club House, 297 Madison Avenue, New York City, on February 5th.

The meeting was well attended and en-

joyed by all.

Since its organization the Air Service Post has enrolled over eight hundred members.

Application for membership should be addressed to Lieutenant Whytelaw, Secretary, Air Service Post, American Legion, Aero Club of America, New York

#### Aviation in Naval Academy Courses

The plan for inclusion of instruction in studies related to aviation has been pracstitudes related to aviation has been approved by a board of officers at the U. S. Navał Academy, of which Capt. Amon Bronson, head of the department of seamanship, is president. The plan has been approved by Rear Admiral Archibald H. Scales, superintendent of the Acad-The complete exhibit of aviation material, collected under the supervision of Capt. T. T. Craven, who originally suggested the plan, includes a Liberty moa cross section of the motor, other aeroplane engines, models of heavier-than-air and lighter-than-air craft, instruments used in navigating the air, a meteorological set, armament, gas accessories, etc. This material has been installed in etc. This material has been installed in the building occupied by the Department Engineering and Naval Con-Marine struction at the Academy. Flying instruction is not contemplated at Annapolis, though there is some sentiment that it should be a part of the post graduate course. In this connection it is recalled that the first flying by officers of the Navy was done at Annapolis, the school afterward being removed to Pensacola, Fla.



An Interallied Aircraft Corporation Avro Plane equipped with skids for winter flying



#### FOREIGN **NEWS**



Proposed Flight to Alaska

Proposed Flight to Alaska

Steps are being taken by Training and Operations Group, Air Service, to ascertain the feasibility of an aeroplane freight to Alaska. Three routes have been outlined, and are being considered. The following has been received from J. W. Tyrrell, of Hamilton, Canada, who has travelled extensively in the subarctics of Canada.

"It is at least partly due to my supposed intimate knowledge of our North Country that I am an officer in the Guides of the Canadian Milita, and the proposed enterprise would seem to me to be exeedingly venturesome if not a dangerous undertaking, although not perhaps more so than many others which have of recent years been successfully accomplished.

"For many reasons the summer season would appear to be the most suitable time for attempting an aerial trip to Alaska or any district in the Arcties; but it would be difficult during the summer season to obtain suitable landing places. The country from Edmonton to the north is mostly covered with timber, although there are some prairie sections along the Peace River and at a few other points, but for the most part, areas which are not covered with timber are composed of fields of broken jagged rocks, upon which it would be impossible for an air machine to land in safety. On the other hand, the winter season in the North Country is so beset by darkness and stormy weather, that a successful air journey to the Arctic is extremely hazardous.

"There is, however, at least one month in the year which offers many favorable conditions to your project, and that is the month of April. By the first of April the storms of the winter season have passed and the North Country enjoys a condition of continuous daylight, and by that time the weather has become comparatively mild, but the condition of the ice on the lakes and ponds is an ideal condition to afford innumerable safe landing places."

#### France-The Reorganization of the Aerial Arm

France—The Reorganization of the Aerial Arm

The seven Observation Regiments (Aeroplanes) are to be stationed as follows: 1st Regt., Tours; 2nd Regt., Longoie (Dijon); 3rd Regt., Beauvais, 4th Regt., Le Bourget; 5th Regt., Lyon (Bron); 6th Regt., Toul; and the 7th Regt. at Pau. They are under the orders of the Army Commanders in whose areas they lie. On mobilization they will be allocated to army corps in accordance with the necessity of the times. The three bombing regiments will, when formed, be stationed at Metz. Maizeville-Luxeuil, and the third at Avord. A detachment will be allotted to the Army of the Rhine.

The three fighting regiments will be stationed respectively at Thionville, Strasbourg, and Chateauroux.

The bombing and fighting regiments will together form a fighting body divided into two groups: (i) an aerial division (1st and 2nd fighting regiments and 1st and 2nd bombing regiments), and (ii) a mixed brigade including the 3rd fighting and 3rd bombing regiments.

Two further aviation regiments, complete in themselves (with observation, bombing, and fighting squadrons in each), will be stationed at Rabat and Casablanca in Morocco, at Hussein Dey in Algeria, and Tunis.

There will in peace time be in these regiments 135 squadrons and between 11,000 and 12,000 aeroplanes.

The force will be controlled by the Director of Military Aeronautics, with two Inspector-Generals subordinate to him—the one technical and the other training.

In connection with recruiting, each of the great firms such as Farman, Caudron, and Morane will be paid 15,000 francs (approximately \$2,900) for each recruit trained by them who takes the military brevet of pilot-aviator.

#### A New Aviatik

The Aviatik works are now busy on the construction of a new giant aeroplane, the planes of which are of 43 metres (140 ft.) span. Four 250 hp. motors will be fitted, and in addition to the crew of six, accommodation will be arranged for 18 passengers.

#### The Cape-to-Cairo Flight

It is officially announced that the Union Government of South Africa as decided to support an official flight from the Cape to Cairo by outh African pilots, and is at present in communication with the Air linistry in London regarding the arrangement of details.

#### Military Aviation in Switzerland

After a lengthy controversy the Swiss Federal authorities have granted a credit of 2,000,000 francs to be used for establishing military aviation in Switzerland. Of the total, 300,000 francs is ear-marked for the purchase of new machines. Major Isler, who is at the head of Swiss military aviation, has withdrawn his resignation which was sent in when the Government wanted to reduce the credit to 1,200,000 francs.

#### Australian Aviation Company

An aviation company with a capital of £700,000 is being formed to promote an inter-State passenger and goods service.

#### Handley-Page London-Paris and Brussels Air Services

On the H.P. London, Paris and Brussels Air Services

On the H.P. London, Paris and Brussels air services between September 2, 1919, and January 22, 1920, 917 passengers and 43,066 pounds of freight have been carried over a distance of 64,293 miles.

A Handley-Page commercial aeroplane recently carried £3,500 worth of jewels to Paris, which included a jade necklace valued at £2,300. Precautions were taken to safeguard the jewels in the event of a landing between London and Paris.

#### Aviation Officials In France

It is announced that M. P. E. Flandin, the new Under-Secretary of State for Aeronautics in France, has chosen M. Bourgeois to be head of the Civil Aviation Department, while Commandant Casse will be Chairman of the military section of the Ministry.

#### Air Mails In Italy

Owing to the railway strike in Italy, it was necessary to organize aircraft services to carry the mails. Aeroplanes were used on the Rome-Pisa and Milan route, and airships between Milan and Turin and Milan and Venice.

#### Australia to Tasmania Air Services

An aeroplane service between Victoria and Tasmania is proposed. Representatives of the Aerial Transport (Ltd.) have recently visited Tasmania to select sites for aerodromes. The landing place for Hobart, the capital, is to be at Brighton, 17 miles distant, and for Launceston, the chief town in the north of the State, at Perth, 12 miles from Launceston. The company anticipates commencing a daily service between Melbourne and Hobart in July next. The trip is to be made via King Island, and is to occupy seven hours. The machines are to be of the Handley-Page type of approximately three tons capacity, capable of carrying 30 passengers. The fare is estimated at £8 per journey, and the freight rate at 8d. per pound.

New Department to Control Aviation in Spain

New Department to Control Aviation in Spain

The Gaceta de Madrid publishes a Decree establishing in the Department of Commerce, Industry and Labor, a section of Aeronautics and Civil Aviation for: (a) Regulating aeronautics and civil aviation from the technical point of view. (b) Formulating the basis on which official instruction is to be given. (c) Drawing up the conditions to be imposed by the State on individuals and companies soliciting aerial services in Spain. (d) Studying foreign legislation and proposing national legislation for these services. (e) Studying the topography of the country for fixing the most convenient aerial routes, the location of landing sites, aerial signals, etc. Reporting on the technical conditions necessary for machines to be authorized and the professional capacity necessary for the pilots in charge of them. (f) Determining inter-departmental relations as regards the aviation question, (g) Drawing up a scheme for the development of aerostatics and civil aviation.

#### Union to Encourage Progress of Aeroplanes in France

A Union for the Security of the Aeroplane has been formed in Paris, France. At a recent meeting, 100,000 francs were set aside as rewards for new inventions, contributing to the science of heavier-than-air machines during 1920.

Patents eligible for consideration must show marked progress in the matters of safety, stabilizers, motors and carbureters, arrangements to assist in making landings easier, speed variations, new landing chassis, orientation (especially in times of fog) and parachutes.

#### Aerial Service, Santiago-Valparaiso

Aerial Service, Santiago-Valparaiso

A Franco-Chileno company is being organized in Santiago with a capital of £100,000 sterling or \$500,000, for the establishing of an aerial transport service between Santiago and Valparaiso, with Farman-Goliath 260 horse-power machines estimated to carry twenty passengers and 300 kilogrammes of correspondence. The apparatus to be similar to those in use in the services of Paris-London, Paris-Brussels, Paris-Lille, and Paris-Bordeaux. A civil aviation school is to be established for the training of pilots.

This is the result of the labors of the French military aeronautic mission at present in Chile under the technical direction of Capt. Jean Guichard. The proposals provide for three trips a day, each occupying forty minutes. A service of motor cars to convey passengers to and from working centres. Correspondence will be charged at 40 cents per letter.

#### To Bohemia By Air

Gradually the aerial services from London to the Continent are extending: an Airco machine left Hounslow on January 26 for Bohemia, carrying one passenger.

#### Czecho-Slovak Flying Corps

From the details which have come through from Prague it appears that the defence services provided for in the military estimates for Czecho-Slovakia recently submitted to the National Assembly, include a flying corps consisting of five battalions with 1,310 aeroplanes.

#### International Air Lines

International Air Lines

The Italian journal Rivista dei Trasport Acrei gives very full details for the proposed aerial route connecting London and Paris with Rome and Brindisi. The journey would be divided into stages: London to Paris, Paris and Lyons, Lyons and Marseilles, Marseilles and Nice, and Nice to Brindisi. The stage between Paris and Lyons, a distance of 385 km., would take 2 hours 34 minutes. The route would be either via Dijon or via Nevers. The latter would be 20 km. shorter. The starting point would be the Le Bourget aerodrome and the point of arrival Bron at Lyons.

The distance could be covered in one flight by a two-engined machine, which could carry fuel for three hours. The second stage would be from the Bron aerodrome at Lyons to the Park of Borely at Marseilles. The route would be along the Rhone valley as far as Avignon and then via Salon and Rognac. An emergency landing stage would be arranged at Montélimar. The distance of 285 km. should be covered in 1 hour 54 minutes.

In the third stage, from Marseilles to Nice, a distance of 205 km., the route would lie along the coast, either by aeroplane or by seaplane. The last stage would be either along the coast from Nice through Genoa, Spezia, Livorno, Civitavecchio and Naples, and then across the Brindisi via Foggia and Bari or across the sea from Nice to Sarzana and down inland via Pisa and Rome. For this service it is computed that two squadrons of six machines, with six pilots and six mechanics, would be necessary for the journeys between London and Paris, and three squadrons of six machines, with six pilots and six mechanics for the journeys between London and Paris, and three squadrons of six machines each, six pilots and six mechanics for the journeys between London and Paris, and three squadrons of six machines each, six pilots and six mechanics for the journeys between London and Paris, and three pilots attached to each station.

#### Aerial Service from London to Lyons Fair

Lyons.—At the request of the committee of the Lyons Fair, it has been decided to create a passenger aerial service between London and Lyons for the duration of the fair. Service will be inaugurated February 27, when the first machine will start from London at 10 o'clock in the morning. The machine is expected to reach Lyons at 4 o'clock in the afternoon.



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon

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Excerpt from F. J. Camm's Book on Model Aeroplanes, (Continued from last week.)

The correct method of finding the capacity of model hydroplane floats is of general interest and is worthy of inclusion

plane floats is of general interest and is worthy of inclusion in this chapter.

The correct method, then, of determining the total cubic capacity of the floats would be to complete the machine without the floats and carefully weight it. If the float attachments were not affixed to the model an ounce or so should be allowed, according to the size and weight of the machine. We will assume the weights, including float supports, to be 6 oz. It will be obvious that at least 6 oz. of water must be displaced to support this weight, and therefore the minimum total cubic capacity of the floats must be (since a cubic ft.,=1,728 cub. in., of water weighs 1728 6

1.000 oz.)—×—=10.4 cub. in., approximately, to displace

 $\frac{1000}{1000} \times \frac{1}{1} = 10.4$  cub. in., approximately, to displace 1,000 oz.)-

6 oz. of water. Floats of this capacity would be almost totally immersed to do this, and since it is necessary that they should only be from ½ to ¼ immersed, owing to the enormous water resistance which would otherwise occur, it follows that the floats should be capable of three or four times this displacement. Two front floats and one large rear one, apparently, give best flotational stability, the rear one being made of fairly high aspect ratio, and situated just forward of the centre of gravity. Methods of float construction are illustrated in the chapter on the Model Hydro struction are illustrated in the chapter on the Model Hydro

-					
LOADING.	MILES	PER H	OUR	FEET	PER SECON
3		10.3			15.2
31/2		11.2			16.4
4		12.0			17.6
41/2		12.7			18.7
5		13.4			19.7
51/2		14.1			20.6
6					
6½		15.3			22.4
7					
71/2					
8					

## "A Racing Model"

The construction of the racing model varies but little from the other type, the frame is constructed much the same as the tractor, only one end is separated by a strip of wood which

the two propellers are mounted.

The frame is a sort of "A" shaped, the long sticks are 36½" long and made of 5/16" x ½" spruce. One end of each stick is cut at an angle as shown in the drawings, a notch

being cut out of the other ends.

Now bend a piece of wire to the shape shown at Figure 3.

This is the terminal for the attachment of the rubber motors.

Bind the sharp ends of the sticks and the hook together in one operation with strong linen thread and glue as shown

in the enlarged sketch.

The strip of wood for the propeller hanger is next put in place, this strip is 12" long and ½" wide at its widest point and tapering to ¼" at the ends. The thickness of this strip is ½". It is fastened with thread and give. Next, out the is ½". It is fastened with thread and glue. Next, put the cross strips of bamboo in place at about the center of the frame. These are made of strip bamboo about ½" thick and

These are made of strip bamboo about 78 times and are for bracing the frame.

The bearings for the propellers are next made from 2 pieces of 1/16" inside diameter brass tubing 34" long and two pieces of thin brass about 1/4" x 11/4". (The long prongs of a brass paper fastener may be used for this purpose.) Now bend the brass strip and solder to the tubing as shown at the top view, left head side of the drawing.

left hand side of the drawing.

It is best to lay the object on a piece of wood, because if laid on metal it might become soldered together. To do good soldering it is only necessary to be careful not to burn the metal and not to use too much solder. It is surprising what good work can be done after a little practice.

When finished faster the hearings in place on the ends of

When finished, fasten the bearings in place on the ends of the propeller hanger, as shown in sketch at left of drawing. The wings are made much the same as the wings for the

Tractor model, the only difference being instead of a spruce entering edge this one is of bamboo with a spruce spar through the center 1/4" x 1/8".

The large wing is 24" long and 5" wide, the small one 12" x 3". When finished cover with china silk or paper and dope with a solution of celluloid dissolved in banana oil. This solution not alone shrinks the fabric but fills the pores as well.

The propellers are cut from a blank 12" long, 1½" wide and 1½" high, as shown at the upper right hand of the drawing. This is the high pitch type and is cut as described in the instructions for propeller carving, as shown previously. When carving the propellers be careful to cut one to turn one way and the other to turn the reverse.

The motor consists of 16 strands of 1/8" flat rubber to

The motor consists of 16 strands of 1/8" flat rubber to each propeller.

To fly, set in the main plane about 4" from the rear propeller spar and the elevator about 8" back of the apex of the frame, insert a small block of wood under the leading edge of the elevator to give it the required angle of incidence. Twist the propellers reverse way a few times to take the slack out of the rubber.

Hold the propellers and propeller spar with the right hand, place the left hand at a point under the elevator to balance.

Now hold the model on a line with the shoulders and throw gently, as in launching the Tractor. (The push should be given with the right hand, the left is used to balance the model.)

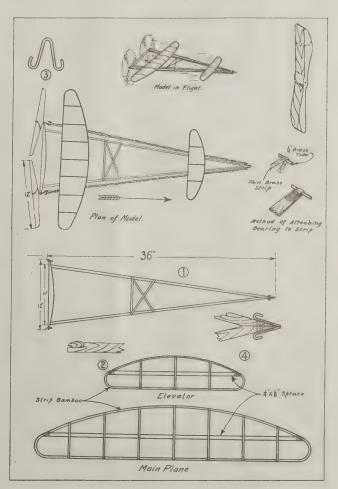
After a few experimental flights shifting the wings back and forth, or placing a thicker or thinner block of wood under the elevator, the model flyers will discover the proper combination to get the maximum flight out of the model.

To wind the motors up it is necessary to have the assistance of another person to hold the model, because it is necessary to stretch the rubber at least twice the length of the machine to get the maximum revolutions out of the rubbers. A small hand drill is used by some model flyers for winding the rubber, while others use an egg beater cut down.

The egg heater is the better winder because it winds both rubbers at

down.

The egg beater is the better winder because it winds both rubbers at once in opposite directions and an even amount of revolutions. If the drill is used it is necessary to wind one rubber one way, counting at the same time, then wind the other the reverse way, counting again, so as not to have one wound tighter than the other.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Among other military questions, let us consider whether airplanes should come under the head of overhead expenses. -The Home Sector.

The Vegetarian Airman
"Hobey" Baker, the young Philadelphia athlete and airman, who made a brilliant flying record during the war, was talking at the Philadelphia Country Club about some of his experiences as pilot.

"I knew one chap," he said, "who crashed in Germany, and tramped 320 miles back to our lines. It took him a month, and he lived the whole time on raw turnips and carrots that he

dug up at night.'
"Gee!" said a "Gee!" said a young lady, "I wonder how such an experience felt?"

"The poor fellow," said the airman, "told me it felt like a root march.

"But suppose," said one of the spectators at the aerodrome "that the parachute should fail to open after you had jumped

"That wouldn't stop me," answered the parachutist. "I'd come right down."—Tale Spins.

Licut. W. B. Maynard, the "flying parson" in the aerial derby, is, of course, what is known in ecclesiastical circles as a high church man.

But, as a Baptist, ought he not use a seaplane?—New York

Or as a Prohibitionist, why not a flying boat?

## MAYOR HYLAN'S SKY COPS.



## Why Fliers Go Insane

The booking agent for a well-known passenger air line sends us a few samples of questions asked by prospective passengers

"If I take my dog with me, do you think he will get sick?"
"Must I take Mothersill's seasick remedy before I go up?"
"Can I stop off to see a friend on the way down?"

"If I get killed do you have to go to prison?"

"Are your pilots blonde or brunette? I read an article that only blonde pilots made good overseas."

"What happens if your engine stalls while we are in the

"Will you promise not to fly too high?"

"How often have you been hurt?"

"Supposing I change my mind at the last moment, do I have to pay aerialage?"—National Service.

Prices and aeroplanes take turns in making new high records on alternate day.s

Private Murphy badly needed a week-end pass, but he had had so many his chances looked very slim. However, he paraded before his C. O.

"Sorr, I would loike to get a week-end pass."
"What's the matter this time? Your grandmother hasn't

died again, surely?

"No, sorr; it's loike this, sorr. Oi've a brother who was born blind, sorr, and he's just got his sight and wants to see me, sorr.'

Ex-soldier wants job in florist's, sounding the alarm every time a century plant bursts into bloom. Address U. S. O. B., Fort Leavenworth.

LARGE PERCENTAGE.—Father—How many people work in your office?

Son (Government employee)—Oh, about half!—Bystander.

## Going Up?

Jiggs: "Where are you working now?"
Biggs: "Down at the munitions plant."
Jiggs: "What do you get?"
Biggs: "Forty a week and prospects."
Jiggs: "What are the prospects?"
Biggs: "Getting raised any minute."

The proposed air-line to Cuba may be all right, but a pipeline would meet a more urgent demand.—Columbia Record.

## Horrors of War

Aunt Sophie gasped in horror as she listened to the con-

fession of her sailor nephew.

"Engaged to four girls at once, are you?" she asked. "However do you explain this disgraceful conduct."

"Dunno," he replied, "I expect old Cupid must have shot me with a machine gun."

First Buck Private—"I didn't get to drill 'till after roll call today but I fooled 'em."

Second Buck Private—"How?"

First Buck Private—"I slipped into ranks when nobody was looking."—Cornell "Widow."



WEEKLY

Vol. 10, No. 21

MARCH 8, 1920

10 CENTS A COPY



BLISHED WEEKLY BY THE AFRIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY bacriptions: Domestic, \$4; Foreign, \$6. Entered as second-class matter March 25, 1915, at the Post Office at New York under the act of March 3rd, 1879



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Exhibiting in the Magnificent Red Room of



BROADWAY & 32ND STREET NEW YORK

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512 Fifth Avenue, New York

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## THE NATIONAL TECHNICAL, ENGINEERING AND TRADE AUTHORITY

PUBLISHED WEEKLY BY THE AERIAL AGE CO., Inc., Foster Building, Madison Avenue and Fortieth Street, New York City

WASHINGTON OFFICE: 413 Union Trust Bldg. LONDON OFFICE: Regent House, Regent St., W.

Entered as Second-Class Matter, March 25, 1915, at the Post Office at New York, N. Y., under the Act of March 3, 1879 Copyright THE AERIAL AGE CO., March 8, 1920

Subscription Price, \$4.00 a year, Foreign, \$6.00. Telephone, Murray Hill 7489

VOL. X.

NEW YORK, MARCH 8, 1920

NO. 21

# SEVENTEEN AERIAL CONTESTS BEING ORGANIZED WITH \$2,000,000 IN PRIZES

A YEAR ago at this time the aeronautic movement was generally given up as a dead baby, and when officials of the Aero Club of America and the Aerial League of America asserted that civilian aeronautic activities would start during the summer and people would order aeroplanes to use for sport placeure to viving and the second order aeroplanes. to use for sport, pleasure, touring and transportation, they were called dreamers.

Undaunted by the opposition of misguided obstructionists and the inertia caused by pessimism, these leaders of the aeronautic movement went ahead with plans which resulted in creating even more public interest and demand for aircraft than had been anticipated.

## \$10,000,000 Civilian Orders

The orders for aircraft for civilian purposes have amounted to over \$10,000,000 during the past six months and were limited by the inability of manufacturers and dealers to make deliveries. The representatives of thirty-two countries who went to Atlantic City to the Second Pan-American Aeronautic Congress and Exposition were ready to place orders and were disappointed to find the American aeronautic industry in a coma state. They reported the state of affairs to their governments and some turned to Europe for the aircraft which they wanted, while other countries are still considering the various types.

## Size of Orders to Be Expected

The demand for large planes and dirigibles for commercial is just starting. Only a fraction of the number of aircraft needed for transportation will be ordered this year, but that fraction will represent as much business as American, British, French and Italian manufacturers can handle on a peace basis

The order placed with the Curtiss Co. for 447 aeroplanes placed by Mr. B. I. Brookins, of which 200 are types selling at from \$9,500 to \$12,500, gives an idea of the size of the orders that may be expected from many of the agents and dealers in small machines. The order placed by the Chinese Government with the Vickers Company for one hundred large passenger-carrying planes, is the size of orders that may be expected from aerial transportation companies.

# Sporting Events Most Valuable for Creating Business and Arousing Public Enthusiasm

The greatest factors in creating demand for aircraft for several years are going to be sporting events—just as the sporting events organized at Atlantic City last May, June and July that created the public interest which resulted in the large

Thanks to the energetic efforts of the Aero Club of America and its affiliated clubs and the Aerial League of America, there are a number of contests being organized with large prizes and calculated to create great public interest.

# Aero Club of America Cables Challenge to France for International Aviation Trophy and Makes Three Entries

The Aero Club of America has cabled a challenge to the Aero Club of France for the International Aviation Trophy, thereby officially opening international aerial sport, which has

been at a standstill since the world war was declared in 1914.

By making these entries, the full quota of entries which each of the national aero clubs affiliated with the International Aeronautic Federation can make, the Aero Club of America indicated to the Aero Club of France that this country intends to go the limit in contesting for the classic international aviation trophy which has been won twice by the United States out of five contests and competing against the most skilful aviators of eighteen countries.

This year the contest, which is to be held in France in September, will demonstrate not only the best airmanship,

but also the best engineering skill of the nations.

For this contest the Aero Club of America is known to already have two aerial "dark horses," entered by the Aero Club of Texas, and the Dayton-Wright Airplane Co., respectively.

Club of Texas, and the Dayton-Wright Airplane Co., respectively. Another entry is expected in the near future.

The type of aeroplane for the Aero Club of Texas entry is kept secret, but it is stated that the backer of this entry, Mr. S. E. J. Cox, the oil magnate of Houston, Texas, has pledged the sum of \$100,000 to develop the best aeroplane for the contest and win the International trophy for the United States.

The Aero Club of America has issued close to 6,000 F. A. I. Pailot certificates therefore pilots are not lacking to ranke up.

pilot certificates, therefore pilots are not lacking to make up the teams.

## Aero Club of Belgium Cables First Challenge for International Balloon Trophy to Be Held in United States

The Aero Club of America has received a challenge by cable from the Aero Club of Belgium for the Gordon Bennett International Balloon Trophy. Challenges are expected within forty-eight hours from the Aero Clubs of France, Great Britain and Italy and Switzerland.

The trophy is held by the Aero Club of America, having been won by the Club team in 1913. The war prevented holding contests since and the Aero Club of America has held the artistic trophy at the Club House, 297 Madison Avenue, New York City.

New York City.

The Club refused to take advantage of the regulations which provide that if other countries fail to challenge the holder of provide that if other countries tail to challenge the holder of the trophy for two years in succession, the trophy for two years in succession, the trophy becomes the holder's property. Then the declaration of war prevented the leading countries that had sent their challenge in 1914 from sending their teams to the United States for the race, the Aero Club of America postponed the race and returned the entry fees, which amount to 500 francs each, and declared that it would hold the trophy open to competition until after the war. This was greatly open to competition until after the war. This was greatly appreciated by the other countries.

The International Balloon Trophy was presented by James Gordon Bennett in 1906 and the Aero Club of America has

won four of the eight contests held since, competing against the best aeronauts of eighteen countries.

## A. C. A. Has 900 Pilots to Select From for Defending Teams

The Aero Club of America has pilot certificates, therefore has an abundance of expert balloon pilots to select from to

make up the defending teams.

If many of the forty aero clubs affiliated with the Aero Club of America want to make entries for this contest, there will be held an elimination balloon race and the three who make the best records will be selected as the three defending

## Seventeen Contests With Large Prizes

ONTESTS with large prizes open to American pilots holding the Federation Aeronautique Internationale (F. A. I.) pilot certificate, issued in the United States by A. I.) pilot certificate, issued in the United States by the Aero Club of America, the sole representative of the Fed-eration in the United States, are:

(1) The \$25,000 prize, offered through the Aero Club of America by Mr. Raymond Orteig, for the first flight from

York to Paris or vice versa.

(2) Los Angeles Aeroplane Rally, with prizes amounting to between \$25,000 and \$50,000, organized by the Aero Club of Southern California and the Aerial League of the Pacific Slope, to be held in April. For details address Mr. K. M. Turner, President, Aero Club of Southern California, Hellman Building, Los Angeles, California.

(3) The International Seaplane Contest to be held at Monaco, April 18 to May 2, for which prizes amounting to about \$35,000 have been offered, open to pilots of all countries in cordial diplomatic relations with the United States, holding the F. A. I. international pilots' certificates. Entries should be addressed to the Secretary, Aero Club of America, 297

Madison Avenue, New York.

(4) First Alaska Aerial Derby for seaplanes, with \$35,000 in prizes, organized by the Aero Club of the Northwest. Start on May 22, 1920, from Seattle to Juneau, Alaska, and return by way of Skagway, Sitka, Petersburg, Wrangell and Ketchican, 870 miles. Open to pilots of all nations holding the F. A. I. certificate issued in the United States by the Aero Club of America. Address entries to Mr. Teel Williams, President, Aero Club of the Northwest, Seattle, Washington.

(5) The Daily Express \$50,000 prize, for the first flight from Great Britain to India and back between May 1 and October 31, 1920, open to all pilots holding the F. A. I. certificate. Entries can be made through the Aero Club of America, or direct to the Royal Aero Club of the United Kingdom,

- (6) The Aerial Contests to be held under the auspices of (6) The Aerial Contests to be held under the auspices of the Aerial League of Cuba and the Aerial League of America during the Third Pan-American Aeronautic Congress at Atlantic City from May 30 to June 10, 1920, open to pilots of all countries in cordial relations with the United States, holding the international F. A. I. pilots' certificates. Entries should be addressed to Major Charles J. Glidden, Chairman Contest Committee, Aerial League of America, 280 Madison Avenue, New York City.
- (7) The King of Belgium Seaplane Challenge Trophy and prizes approximating \$10,000, for a seaplane contest to be held at Antwerp, Belgium, in July, 1920.
- (8) The six Intercollegiate Trophies and \$5,000 Valentine prizes for intercollegiate contests being organized by the Aerial League of America. Entries should be addressed to

Major Reed G. Landis, Secretary, Aerial League of America, 280 Madison Avenue, New York.

- (9) The Curtiss Marine Flying Contest for \$1,000 cash prize, open to members of the Aero Club of America and its affiliated clubs. Entries should be addressed to the Aero Club of America.
- (10) Chicago Aerial Rally with prizes approximating \$50,-000, to be held in July or August, being organized by the Aero Club of Illinois. Address inquiries to Mr. James E. Stephens, Club of Illinois. Address inquiries to Mr. James E Vice-President, Aero Club of Illinois, Chicago, Ill.
- (11) The International Aviation Trophy Contest to be held in France in September, 1920, for which the national aero club of each of the countries represented in the Federation can enter three representatives. The Aero Club of Texas and the Dayton-Wright Airplane Co. have each made an entry in this contest. The Aero Club of Illinois is also considering making an entry,

(12) The International Marine Flying Trophy Contest, \$5,000 first prize, to be held in Italy in September, for which the national aero club of each of the countries represented in the Federation can enter three representatives. entries must be made through Aero Club of America.

- (13) The First Aerial Derby Around the World, the rules and regulations of which are being considered by the Federation at date of writing, and for which \$1,000,000 in prizes are being raised. This stupendous contest is to be an annual event, and the first Derby will take place as soon as the national aero clubs have made the necessary preparations to take care of organizing this event in the territory over which they have jurisdiction.
- (14) The International Balloon Trophy Contest, to be held in the United States in October, for which the national aero club of each of the countries represented in the Federation can enter three representatives. Entries must be addressed to Aero Club of America, 297 Madison Avenue, New York.
- (15) The International Aerial Derby Across the United States, with \$100,000 in prizes, being organized by the Aerial League of America, which will be open to all the national aero clubs and clubs and organizations affiliated with the Aerial League of America and the Aero Club of America. Date to be announced later.

(16) The \$2,000 Glidden Aerial Trophy Touring Contest, being organized by the Aerial Touring Association, of which Major Charles J. Glidden, of the famous Glidden Tours, is president. Entries must be addressed to Aerial Touring Association, 280 Madison Avenue, New York City.

(17) The Aerial Circuit of the Atlantic from New York or Atlantic City southward by way of Cuba, Haiti, Porto Rico, across the Caribbean Sea, to Caracas, along the coast to Pernambuco, across the Atlantic to Dakar, on the west coast Pernambuco, across the Atlantic to Dakar, on the west coast of Africa, then northward along the coast of Africa, touching Magodor and Casa Blanca, then across Spain or Portugal to Biarritz, then along the French coast and across the English Channel to London. Then either across the Atlantic by way of Ireland to Newfoundland, or touching and across the Atlantic by way of Iceland, Cape Farwell, Newfoundland, Halifax, Portland, Boston, and New York.

This annual contest has been proposed by the Aerial League of America and the tentative project has been submitted by the Aero Club of America to the International Aeronautic Federation, for consideration of the national aero clubs of the eighteen countries in the Federation. There is a possibility that it may be organized this year. Otherwise it will be organized next year. Prizes amounting to \$100,000 are proposed for this contest. posed for this contest.

## AMERICAN AVIATORS INVITED TO COMPETE FOR \$50,000 PRIZE OFFERED BY THE "DAILY EXPRESS" FOR FLIGHT FROM GREAT BRITAIN TO INDIA AND BACK

N invitation to American aviators to compete for the An invitation to American aviators to compete for the \$50,000 prize offered by the London Daily Express for a flight from Great Britain to India and back was received to-day by the Aero Club of America from the Royal Aero Club of the United Kingdom.

The rules for this contest are as follows:

1. The proprietors of the Daily Express offer a prize of the Only for the enterpt who first average wader the subjected.

11. The proprietors of the Daly Express offer a prize of £10,000 for the entrant who first succeeds under the subjoined conditions in carrying by air a cargo of 1,200 pounds from Great Britain to India and back.

2. The competition is open to persons of any nationality holding a license issued by any aero club affiliated with the Fédération Aeronautique Internationale.

3. The competition shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aeronautique Internationale. The flight must be accomplished between May 1, 1920,

and October 31, 1920, both days inclusive.

5. The time occupied on either the outward or homeward journey is not to exceed 288 hours, and the homeward journey must be commenced within fifteen days of the arrival in India. (a) The cargo may be carried on one aircraft or may be distributed between not more than two aircraft.

(b) Aircraft may be changed en route provided that all (Continued on page 800)



# THE NEWS OF THE WEEK



## Extensive Blimp Service Planned

A line of passenger-carrying airships will be in operation between New York and near-by cities soon. Later it may be possible for a New Yorker to board a blimp one evening and the next day find himself in Havana. Within a year, it is expected, New York and South America will be linked by a dirigible transportation line.

The Pan-American Air Service Corporation is now developing plans looking toward a first flight about May 1. Routes are being mapped out between New York City, New Haven, and Springfield. The company already has two dirigibles of the semi-rigid type, 181 feet long and 36 feet wide, to carry six passengers. Six machines of this type will be used for flights in this country, while a fleet of more commodious dirigibles will be built for

South American traffic.

Arrangements have been made with a large local hotel combine to have booking

offices at prominent hotels.

The Pan-American Company is the first firm to try to develop the dirigible commercially on this side of the Atlantic. Before the war a line of airships between Hamburg and Berlin, carrying 17,000 passengers was operated at a profit, and was so successful that passengers had to book their seats thirty days in advance. The Bodensee, a German blimp, seating twenty-four, is now operating daily between Berlin and the Swiss border. It will be dirigibles a little larger than the Bodensee type that the Pan-American Company will eventually put on the South American run.

The Pan-American route as tentatively mapped out will be: New York, Palm Beach, Cuba, Trinidad, Georgetown, Para, Pernambuco, Bahia, Rio de Janeiro, Sao Paulo, Porto Alegro, Montevideo, and Buenos Ayres. The trip to Buenos Ayres, it is estimated, could be made in seven days. The usual time by water is twenty to twenty-five days.

to twenty-five days.

A new era for South American business

will open up with the establishment of commercial dirigible service.

The lowest steamship passage to Buenos Ayres is about \$350, while superior acommodation aboard a dirigible that would make the trip in a third of the time would be only \$750.

## Laura Bromwell Flies Over New York

On February 17th Miss Laura Bromwell, first aviatrix to receive a flying liweil, first aviatrix to receive a hying ficense since the war, made the first business flight over New York City ever made
by a woman. She assisted in the introduction of the Universal Film Company's
production, "The Great Air Robbery," to
its run in New York City.

Miss Bromwell flew a Curtiss Oriole

and dropped announcements over the theatre section of New York. This is her second flight made in connection with commercial aviation and is only the beginning of the regular work which she intends to take up as a result of her flying training at the Curtiss flying school, Mineola, L. I.

## Newark, N. J., to Have Aerial Inspector

Newark, N. J., the first city in the United States to enact aerial ordinances governing air traffic over its confines, completed a bill for the regulation of air traffic over the State of New Jersey. The bill was prepared by the city's legal department at the request of Mayor Gillen and will be presented in the New Jersey Legislature by Assemblyman James A. McAteer.

## Aviation Club for Detroit

A million dollar home for aviators of the flying corps of the army will be erected on a plot of 870 acres just outside Detroit, work to commence this spring, it was announced at a meeting of the Detroit Aviation Club, in the Board of Commerce, Detroit, February 11:

A landing field 3,000 feet by 2,000 feet

is included in the specifications. The new home will be a national rendezvous for air men, it is expected. In addition, it will be one of the most important accomplishments scheduled for the coming year in the science of aviation.

In addition, Detroit business men and government officials are endeavoring to make Selfridge Field, at Mt. Clemens, just north of Detroit, a permanent flying These two fields would make Detroit one of the most important aviation centers in the country.

## Bristol Exhibits Plane at Imperial Hotel

The exhibition of the Bristol aeroplanes in the magnificent Red Room of the Im-

in the magnificent Red Room of the Imperial Hotel during the Aeronautical Show week in New York will undoubtedly attract a very great many visitors.

William G. Ranels, manager of the Bristol aeroplanes, has just returned from Europe and brought with him one of the Bristol Tourer models, which will be shown for the first time in this country at this exhibit

at this exhibit.

The Bristol Tourer is made in two- and The Bristol Tourer is made in two- and three-passenger models and is equipped with a 240-horsepower Siddeley "Puma" engine. It has a top speed of 115 miles per hour, a cruising speed of 90 miles per hour, and a cruising range of 540 miles.

The Tourer has a wonderful performance record, which commends it as an ideal plane for general utility. Its climbing performance, a feature which is of vital interest to the western aviator, is remarkable as its ceiling affords passage

markable, as its ceiling affords passage over Pike's Peak, the highest point in America, with 4,000 feet to spare.

The finish of the machine is of an unusually high standard, for which the Bristol Company earned an enviable reputation during the war. Large, comfortable wicker chairs are provided for both pilot and passenger. One of the features of the machine is a large gravity gasoline tank fitted into the center section of the upper wing to supplement the regular tank in which a surplus supply of fuel sufficient for one full hour flight is always available in case of necessity.



The Bristol Tourer Biplane on Exhibition in the Red Room of the Hotel Imperial, New York City

## Aero Club at University of Texas

About fifty ex-army and naval aviators have established the University of Eero Club. The members are students in the University and many of them hold reserve commissions in either the army

or navy.

The club was organized to promote interest in aviation, to keep posted on new inventions and experiments in aeronautics, to study new types of aeroplanes and engines, and in general, to keep in touch with activities in the aviation world. Meetings are held every two weeks and

are in the form of banquets.

Major Reed Chambers, Captain Clayton Bissell, and Lieut. Samuel G. Fryerson have delivered addresses at past

meetings.

meetings.

The officers of the club are: Joseph M. Dawson, formerly Captain A. S. A., president; W. E. Steele, vice-president; Nugent E. Brown, secretary-treasurer; Barry W. George, formerly Captain A. S. A., Dan A. Simmons, and J. A. Gammel, board of directors.

## British Pilot Plans Flight Around World

London.—A dispatch from Melbourne says Captain Sir Ross Smith has landed at the Point Cook aerodrome there, concluding his flight from Sydney to Melbourne, the last stage of his trip from England.

Captain Smith, completed the flight from England to Australia, and now has in view a flight around the world. The Vickers company is now constructing an aeroplane which floats so that it can alight anywhere in the ocean. It will be equipped with Condor engines, more than double the power of the Vimy which Smith recently used on his tour. He believes the world can be encircled in 70

## Will Resume Aerial Forest Patrol

Major Albert D. Smith will have charge Major Albert D. Smith will have charge of one wing of the aerial forest patrol, operating over six Pacific coast states during the coming summer. Actual patrol of the various forest reserves will start about May 1. Tentative plans call for the employment of about 90 aeroplanes divided in the five sequences of 18 pack. vided into five squadrons of 18 each. Operating bases will be from March field; Rockwell field, San Diego; Mather field, Sacramento; Red Bluff, Medford and Eu-gene, Ore.; Camp Lewis and Spokane, Wash.; Boise, Idaho; Missoula and Helena, Mont., and Cody, Wyo.

## French Enter Balloon Race

Paris.-The French Aero Club has an-



Miss Hazel Riley, of Oakland, Cal., the first woman law officer to use an aeroplane in the discharge of her duties

nounced that it would send three balloons to America this year to compete in the races for the James Gordon Bennett Cup.

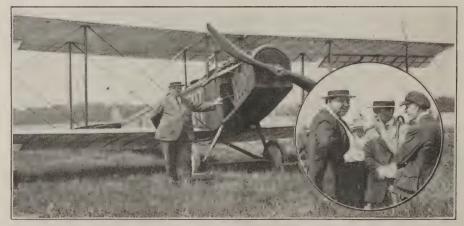
## New York Plans Aerial Laws

Albany.—Probably the first measure regulating and restricting the use of airships to be brought before any Legislature in the United States was introduced in the Assembly recently by Assemblyman George H. Rowe of Eric. The bill pro-vides for a fee of \$25 for licensing each ship and a charge up to \$25 for licensing each pilot.

Under the Rowe bill an aviator could not fly near the rooftops of cities, the limit being fixed at 3,000 feet. He could, however, drop down to within 1,000 feet of incorporated villages. The measure provides also that an aviator shall not fly over a massed assemblage of 100 or more people and shall not drop any mis-sle or other articles except over grounds

devoted to flying or without having obtained special permission.

An airship is defined as any kind of vehicle intended for use "as a means of transporting passengers or goods in the air," and an aeronaut is defined as any person who directs the flight of an air-



In the insert Harold J. Binney of the Canadian Photo Play Productions, who weighs 343 pounds, and who recently made a flight over Toronto. The passenger by the machine weighed also over 300 pounds

## Prospects for Philadelphia Show Bright

Interest is accumulating daily in Phila-delphia's Aeronautics Show of 1920 which will be given in the First Regiment Armory, March 22 to 27.

The ticket-selling plan has been organized on a city-wide basis, and it is conservatively estimated that the attendance will exceed 50,000 persons. Added stimulus has been given ticket sales by the announcement that a free air-ride goes with every one hundred tickets sold.

In Philadelphia sporting circles keen interest is being evinced in the proposed fifty-mile aero race which will be held providing proper sanction is given by the Aero Club of America. The show management has already asked permission to hold this contest and the request is under consideration.

The show is rapidly gathering in all of the important activities of Philadelphia's civic and commercial life. On each night of the show special attention will be given to some important Philadelphia institu-tion such as the famed Franklin Institute, the Engineers' Club, the Aero Club of Pennsylvania and Pennsylvania Military College. The Aero Club of Pennsylvania is taking a very keen interest in the show and will hold meetings nightly while the exhibition is in progress. Each of the four hundred members of the club has pledged himself to induce at least ten other persons to attend the exhibition. In addition the members have volunteered to serve as guides and demonstrators, and in fact will conduct a vigorous campaign during show week to get Philadelphia wide awake on things aerial.

Many days before the opening of the big exhibition Philadelphians will have constant reminders of the fact that an aerial show de luxe is in store for them. Model aeroplanes will be placed on exhibition in shop windows and other conspicuous places all over the city. The exhibition is already taking a strong grip upon the imagination of the public school children of the city.

Aside from exhibits of all kinds of Philadelmachines and their accessories, Philadelphia's Aeronautics Show of 1920 has the following objects: To make Philadelphia an active center of the aeronautics industry; to promote a city-wide movement for a municipal landing field; to promote interest in aeronautics for private, commercial and scientific purposes; to interest wide-awake Philadelphians in owning aeroplanes so that flying may become general instead of casual in Philadelphia.

## Major Schroeder Breaks Altitude Record

After reaching an altitude of 36,020 After reaching an altitude of 36,020 feet in a La Pere biplane, breaking the world's record, Major R. W. Schroeder, chief test pilot at McCook Field, lost consciousness and fell with his aeroplane more than five miles in two minutes; regained partial consciousness when 2,000 feet high and landed eafaly. feet high and landed safely.

Major Schroeder lost consciousness when his machine had reached a height recorded by instruments as 36,020 and his oxygen tanks became exhausted, and it was this which robbed him of consciousness and caused him to fall.

The sudden change in air pressure as he descended from less than three pounds at 36,000 feet to 14.7 pounds at sea level, crushed the gasoline tanks on his plane and caused them to collapse.

Major Schroeder's barograph record is being sent to the Aero Club of America for homologation.

# THE NEW YORK AERONAUTICAL EXPOSITION

THE New York Aeronautical Expo-Armory on Saturday, March 6th.
There was a very large and interested attendance.

The exhibits cover every phase of aeronautics and the indications at the time of writing are that the Exposition will be thoroughly successful in every

Following is a description of most of the exhibits and the remainder of the exhibits will be described in our issue for March 15th.

## Aerial Age Weekly

Aerial Age will have an information and service station at the show for the benefit of its many clients and subscribers

in the Middle West.

AERIAL AGE holds many distinctions, among them (1) that of having been the first publication in the United States to urge the creation of the Council of National Defense and having continued the campaign of national education which resulted fifteen months later in the crea-tion of the Council and, subsequently, the creation of the Aircraft Production Board.

(2) That of having been the first publication to donate advertising space for the Mobilization of Industries, for Re-cruiting and for the Liberty Loans.

(3) That of publishing twice as much

technical material and trade and news items as any other aeronautic publication.

(4) That of publishing weekly the com-plete official reports of the Army and Navy Air Services together with articles by the recognized authorities on Military and Navy aeronautics, thereby insuring to the reader a more complete representa-tion of Army and Navy aeronautics than is afforded by any other publication in the United States.

That of always publishing articles on technical developments written by authorities on the subject, refusing the purely theoretical essays of men who have not had actual experience in original research, in the factory, or in the field, whose theories only lead to costly fail-

whose theories only lead to costly failures to those who adopt them.

(6) The distinction of having carried a larger amount of advertising in 1919 than any other publication.

There are many other distinctions, but the above explains how AERIAL AGE be-

came the National Technical Engineering ful, ever changing scenery, but luxury as and Trade Authority.

## The Aeromarine Exhibit

The period of the war was a busy time for the Aeromarine Plane & Motor Co., of Keyport, N. J., but the sixteen months since the war have been even busier. The character of the work carried on has changed markedly, however. With the Navy clamoring for flying boats during the most than the state of the s ing the war the rapid production of fighting craft was the chief aim of the com-In the period of peace just past painstaking experimentation and planning of peace types of flying boats have suc-

ceeded the struggle for output.

The engineers of the company, headed by Charles F. Willard and Paul G. Zimmermann, have added the experience gained in the manufacture of 300 naval seaplanes and flying boats to the theoretiand practical work of the past year and four months. The result has been the creation of several types of flying boats with distinct sporting and commer-

cial uses.

Perhaps the most interesting of the new peace models is the Aeromarine Limousine, a flying boat absolutely unique in the combining of safety, comfort, and service. This cabin boat is the principal feature of the large Aeromarine exhibit at the show.

The Aeromarine Limousine, known as the 50 B-2, is a three-passenger pusher flying boat with a speed of seventy-five miles an hour. The pilot sits in the bow and just behind him sit the two passengers, side by side. Over all three, in a gers, side by side. Over an time, in a graceful, stream-lined curve, rises the roof of the cabin. The roof is built as a solid part of the hull, and consists of transparent celluloid sheets set in strong frames, so that the view of the pilot and passengers is unobstructed.

The hull or cabin is finished in blue leather and polished mahogany. Within the roomy compartment one gets the impression that one is seated in a beautiful sedan. As a matter of fact this is true, but instead of wheels this sedan has wings. The upholstery, the furnishings, the compartments and drawers lining the compartments and drawers lining the sides of the heat and also the how the sides of the boat and also the bow, the many little comforts, are all specially planned to make the aerial tourest feel that in exchanging the road for the air he has gained not only speed and wonder-

well. The wide doors entering the cabin are watertight.

An eight-cylinder V-type motor of 150 horepower, every part of which is built in the Aeromarine factory and known as the B-8, furnishes the power. The motor is set between the wings some distance behind the cabin. A wind driven pump lifts the gasoline from this tank to a smaller tank in the upper wing, whence it flows by gravity pressure to the motor. Forty gallons of gasoline may be carried, enough for about three and a half hours at full speed. This means a range of approximately 250 miles.

The characteristics and specifications of the "50 B-2" are as follows:

Overall length28' 11 3/16"
Overall heighth12' 7"
Weight (light load)2280 lb.
Weight (full load)3225 lb.
Useful load 945 lb.
Span48' 6"
Total area 504 sq. ft.
Wing curve
Maximum speed
Minimum speed44 M.P.H.
Climb in ten minutes2200 ft.
Endurance in hours3.4 hrs.

## Upper Wing

Span
Area304 sq. ft.
Chord6' 3"
Angle of incidence4' 20"
Dihedral angle176°

## 7 3371

Lower Wing
Span
Area
Chord6' 3"
Angle of incidence3° 0'
Dihedral angle176°
Stagger
Gap6' 6"
SweepbackNone
Decalage1° 30′
Area of ailerons (2)58.0 sq. ft.
Area of elevators (2)25.6 sq. ft.
Area of rudder17.5 sq. ft.



The Aeromarine Limousine, one of the most luxuriously equipped exhibits at the Show

Area of stabilizer39.	.0 sq. ft
Area of fin	
Skid fins	
Engine45° ".	B" type
Horepower	
Tank capacity	.58 gal
Load H.P	23.8
Load sq. ft	6.15

In addition to the "ships" the Aeromarine company are showing two motors built in the Keyport factory. One of these is the "B-8" motor used in the 50 B-2, a 150-horsepower eight-cylinder engine of the V-type. The other is the "L-6-D" type, a six-cylinder block motor of 130 horsepower. Both these motors were designed by Aeromarine engineers. They have successfully undergone the most trying tests.

Air maps, the product of a new department of the Aeromarine company, and many remarkable protographs of the Aeromarine boats and plant are also exhibited.

# The American Propeller Company Exhibit

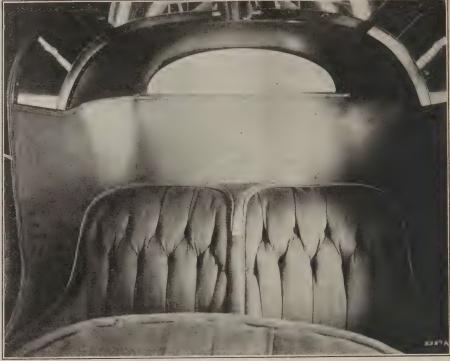
The American Propellor Company exhibit a large assortment of propellers from the small air-fan used in driving generators for heating, lighting and radio, to single, two, three and four-blade air-screws for fighting and bombing planes. This company's exhibit consists of various types of propellers made for the government program.

## Brewster-Goldsmith Co. Exhibit

The Brewster-Goldsmith Co. will exhibit their spark plugs, which have escorted a number of the most interesting records of late.

Lieutenant-Colonel Reynolds used a set of B-G plugs, which were installed at Langley Field, Virginia. He flew these to Mineola, then across the continent and back, and finally returned to Langley Field. No change of plugs was required and they were functioning properly on their return to the home field.

Captain Donaldson's and Lieutenant



Interior view of the Aeromarine Limousine

Manzelman's B-G plugs also gave perfect account of themselves despite the length of the flight and the serious weather conditions encountered.

The official report of Lieutenant-Colonel R. S. Hartz's "Run" flight states that a set of H-G plugs gave a perfect performance in that gruelling 9283-mile flight. The set of plugs used were tested for 30 minutes in a D-H prior to the flight. While on the flight they had 24 hours 25 minutes warming time and approximately 114 hours 45 minutes flying time—a total of 140 hours.

The Martin biplane, with the exception of two nights, was out of doors without protection between July 24 to November 9. After standing for 31 days at Jay, N. Y., where it was held for repairs, the left motor was cranked on the first try

and the right motor started on the second try, although the engines had been idle in the open under all possible climatic changes during that period. Not once during the entire flight was a spark plug miss recorded and never was difficulty in starting the engines attributable to the failure of the ignition system.

It is apparent that the new features of design embodied in the B-G plug are important improvements, and their success in the recent competitions justifies the conclusion that they will function reliably and faithfully in the highest compression engines used on aircraft and reduce by a large percentage the renewals required.

A technical description of the plugs was printed in Aerial Age for November 10-17, 1919.

## The Curtiss Exhibit

The Curtiss Aeroplane and Motor Corporation are exhibiting five planes. One of these—the new ten-seater Curtiss Eagle, twin-motored land machine—has never been shown before and is the latest type of machine produced in America. The others include the three land machines—the Oriole, three-seater; the JN-4D and the Standard J-1, two-seaters, and one flying boat, the Curtiss Seagull, three-seater.

In addition to these five aeroplanes, the Curtiss exhibit includes its latest development in aeronautical motors—the new C-12, 400-horsepower; the K-6, 150-horsepower motor, which has been one of the year's sensations; and the well-known OX-5, 90-horsepower motor, which gained its reputation as the motor equipment of practically all of the training planes used during the war. The research division displays an interesting collection of models used in the wind tunnel tests at the Garden City plant of the company, a miniature model of the famous Curtiss wind tunnel, instruments used in testing the strength of various parts of aeroplanes and those used by Rohlfs in his record-breaking altitude flight, when he attained



The Brewster-Goldsmith Spark Plug Exhibit

34,910 feet in a Wasp triplane fighting machine.

## The Curtiss Eagle

The new Eagle represents the last word in aeronautical design, differing from the machine which was used at the Chicago Aero Show in January in that it has an increased seating capacity, its motive power is provided by two of the new Curtiss C-12's instead of three K-6's, giving it 800 horsepower instead of 450, and resulting in increased speed and enlarged flying radius. Its appointments are more elaborate, the designers having provided it with a baggage-carrying compartment, a lavatory, flying lights for night flying and every other essential for long-distance flights.

The new plane is an aerial limousine in reality. Built along the basic lines of the eight-seater Eagle, which after its public announcement flew 4,400 miles and carried 943 passengers during a period of two months last fall, the new machine is better adapted for passenger- and merchandise-carrying. Built to carry nine passengers and a pilot, the Eagle, as a commercial vehicle, will carry a useful load of 3,380 pounds. It is expected that it will prove to be an ideal plane for aerial inter-city tours which are being planned for 1920.

One hundred and twenty-four miles per hour is the rate of travel of the new Eagle. It has a flying range of 750 miles with full load. This is almost the distance between New York and Chicago. Such a cruising radius means a great deal to the future of aerial travel, for it permits nonstop flights between such centers as New York—and Washington, Philadelphia, Cleveland or Boston; Chicago and Des Moines, St. Louis and the Twin Cities.



The Curtiss K-12 400 H.P. motor

At full speed the Eagle would "make" Philadelphia in an hour, Washington in two hours and Cleveland in four hours.

The Curtiss Twelve, which is the motive power unit for the Eagle, is an improved design of the motor which carried Roland Rohlfs on his 34,910-foot climb in the Curtiss Wasp. After several months, the motor division has succeeded in adapting this motor to commercial uses, and it is believed to be the lightest motor per horsepower in the world. Although a 400-horsepower motor, the C-12 is actually lighter than any of the non-rotary or radial motors of 300 horse-

power now in regular use. Its total weight is only 675 pounds, or 1.69 pounds per horsepower. The Eagle will fly with only one of the two motors in operation.

Its general dimensions are: Width, 64 feet 4 inches; length, 36 feet 7½ inches; height, 12 feet 11 inches.

This machine will, at the conclusion of the New York Show, he shipped to I. B. Humphreys, president of the Curtiss-Humphreys Airplane Company, Curtiss distributer for the Rocky Mountain states, and used in an aerial sight-seeing line between Denver and Estes Park, Colorado.



The new Curtiss Eagle, equipped with two C-12 400 H.P. Curtiss motors. Its general dimensions are: Width, 64 feet 4 inches; length, 36 feet 7½ inches; height, 12 feet 11 inches. It has a maximum speed of 124 miles per hour. It carries 9 passengers and pilot. On the right of the illustration is the Curtiss Seagull flying boat, which has accommodations for two passengers and pilot. The photograph was taken in the Curtiss factory at Garden City, Long Island

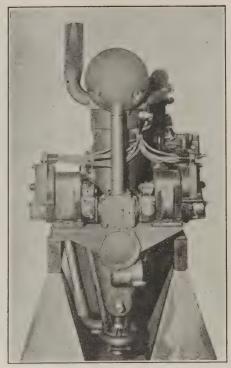
## The Curtiss Oriole

The Curtiss Oriole, shown at the New York Aero Show, is one of the stock machines which the Curtiss Aeroplane and Motor Corporation is now producing in large numbers at their Buffalo plant. This three-passenger, electrically-started aerial "fly-about" was designed last spring to meet the needs of a business and pleasure world that had come to realize the practical value of aviation.

It won almost instantaneous favor from

men who were changing to this newest means of travel. Essentially a passenger carrier, the Oriole has its practical uses and machines of this type have added many a notable chapter to peace-time aeronautics.

The Oriole was announced by the Curtiss Company in May. A few days later it won first prize for speed and distance flying in the commercial class of aero-planes at the Aero Carnival at Atlantic In August it won first prize for speed among the civilian types of aero-planes in the New York-Toronto aerial planes in the New York-Toronto aerial derby. In October an Oriole completed a trip between Houston, Texas, and New York City, via Buffalo, covering 2,500 miles in 19 hours and 45 minutes. Due to weather conditions, the party, including Mrs. S. E. J. Cox of Houston, Texas, here son, Seymour, Jr., and Pilot H. C. Block, were nine days en route, but the entire expense of the trip, including fuel, hotel accommodations, etc., were only \$275. This machine, delivered from Buffalo



The Curtiss K-6 150 H.P. motor

under its own power, made the entire trip without even so much as a changed

spark plug. Another Oriole, piloted by E. H. Rogers, manager of the Syd Chaplin Aircraft Corporation, Curtiss distributers for Southern California, made a non-stop flight between Los Angeles and San Francisco and return in one day—the first time this feat had ever been accomplished by other than a war-time plane. In Washington, when the Orioles accompanied the Curtiss Eagle in its government. ernmental demonstration at Bolling Field, they made a great flying record by carrythey made a great flying record by carrying hundreds of prominent Washingtonians, in all kinds of flying weather, successfully and safely. An Oriole, sent to South America as a demonstrating plane by C. W. Webster, Curtiss representative, established a new non-stop flight record in Peru, and was subsequently sold to Juan Leguia, son of the president of that republic. A non-stop flight record between Buffalo and New York is also held by the Oriole—four hours and five minby the Oriole-four hours and five minby the Oriole—four nours and are used to the 400-mile journey. Orioles are now being operated in all portions of the United States and for a variety of the United States and for a variety of the unit of the column tanchers.

the United States and for a variety of purposes—by oil men, ranchers, etc. It was the first machine to land in historic Estes Park, outside of Denver.

The general dimensions of the Oriole are: Length, 25 feet; width, 36 feet; height, 9 feet. Its gross weight is 2,354 pounds, and its useful load 790 pounds. It is equipped with a Curtiss K-6, 150-horsepower motor, which gives a maximum of the second horsepower motor, which gives a maximum speed of 96 miles per hour, faster than any other pleasure craft built-and



A 100 H.P. Curtiss "Seagull" Flying Boat. An un-retouched photograph taken from another aeroplane



A group of Curtiss Orioles, one of which is on exhibition at the Show, about to undergo flight test

a flying range of approximately 440 miles on 45.5 gallons. Its landing speed is nominally 49 miles per hour, which permits it to land in almost any size field. It is designed for comfort, the passen-

ger-compartment being well-padded and allowing good vision. A side-door en-trance, a large windshield which affords protection from the wind are two of its features. The body is of monocoque construction and the fuselage is laminated wood type, painted a bright orange. The machine is fitted with dual control, the stick and rudder-bar in the passengercompartment being removable.

The Curtiss Seagull
The Curtiss Seagull, which is shown, is another stock machine. It will be an exact duplicate of the many of its

kind that are now flying in America as well as in some of the foreign countries.
This type—the first three-seater produced in America after the close of the war, was designed to meet the demands for a peace-time water craft embodying safety, comfort, speed and durability.

With an experience in flying, design and construction—an experience dating back to 1909 when G. H. Curtiss invented this type of aircraft—it was a comparathis type of aircraft—it was a comparatively easy task for Curtiss designers to bring out such a machine. The predecessor of the Seagull, the MF boat used almost exclusively by the U. S. Navy as a training plane for naval pilots, possessed most of these characteristics but in order to satisfy the demand for a three-seater, Curtiss designers made changes in the construction of the hull and in the

motive power.

The Seagull has contributed generously to the year's aerial history. The first model, shown at the New York Show last year, was shipped to the Scandinavian countries where it is still operating after a year of almost constant service. of the most interesting feats was a flight from Christiania, Norway, to Helsingfors, Finland. It has made several distance flights in America. Piloted by Capt. G. Tallbot Willcox, formerly of the Royal Flying Corps, a Seagull is now at Tampa, Fla., after having completed the longest Fla., after having completed the longest trip ever made by other than a government flying boat—a trip starting at New York, up the Hudson, down the St. Lawrence, Ohio and Mississippi Rivers to New Orleans and thence to Tampa. On this trip, Capt. Willcox has carried hundreds of passengers. W. M. Blair, of the Thompson Airplane Company of Detroit, Mich., Curtiss distributors for that state, flew a Seagull from Port Washington to Detroit—700 miles—in 13 hours ton to Detroit—700 miles—in 13 hours and 45 minutes, after combatting head winds most of the way.

The general dimensions of the Seagull are: length, 28 feet, 10 3/16 inches; width, 49 feet, 93/8 inches; height, 11 inches, 97/32 inches. Its gross weight is 2,726 pounds and its useful load, 769 pounds. It is equipped with the Curtiss K-6, 150 horse-power motor which gives it a maximum speed of 76.5 miles per hour and a flying range of approximately 288 miles

per hour.

Comfort and accessibility is provided in the seating arrangement. The forward seat for the pilot is well-upholstered bucket seat sufficiently clear of the passenger seats to allow plenty of kneeroom. Removable upholstery for the two passengers' seats is provided. The design of the hull and windshield combined prevent spray and wind from coming into prevent spray and wind from coming into the cockpit but does not detract from the visibility. The hull is of ash, keel and longerons with spruce trussing and steel re-enforcement. The bottom and side planking is of mahogany veneer. The hull is finished in natural mahogany above



The three motored Curtiss Eagle Biplane

the waterline and in marine green on the bottom. The gasolene consumption is 13.3 gallons per hour.

## The Curtiss JN-4D

The Curtiss JN-4D is one of those included in the government purchase last year. These machines, which are familiar to every American and Canadian flier as a result of their almost exclusive use as training planes, have given commercial aviation its needed impetus and bridged over the period of readjustment. JN's have led the way in commercial experimental work. Dr. F. E. Brewster of Beaver City, Neb., purchased a JN-4D at the New York Show last year and has been using it ever since in making emergency medical calls. Society Brand Clothes purchased two of them at the Show and inaugurated the first regularly-scheduled aerial merchandise delivery. Operating on a rigid, minute-to-minute schedule, these planes delivered shipments of electrons to proceed the control of the of clothes to merchants within a radius of 250 miles of Chicago, making deliveries to 105 towns and cities in eight states and a total mileage of 16,290 miles. In each instance, the JN has fulfilled every re-

quirement.
The JN-4D is the acme of years' experience in building aeroplanes. Developed as a training plane, it went through a four year's process of refinement which is symbolized in the JN-4D—the last type. Economy of operation, maneuverability and rigid construction made it admirably adapted to training purposes. When it entered the commercial field, these characteristics gave it precedence over all other types. With the paucity of landing fields in America, the JN was able to withstand the shocks of landing in improvised areas. Its low landing speed, and its familiarity to pilots who took up commercial aviation, gave it an advantage over all other makes.

Its general dimensions are: length 27 feet, 4 inches; width, 43 feet, 73% inches; height, 9 feet, 105% inches. Its gross weight is 2,025 pounds and its useful load, 490 pounds. Its maximum speed is 75

miles per hour and its landing, 45 miles per hour. Its gasoline consumption is 9 gallons per hour. Its range on 21 gallons of fuel is 150 miles.

### The Standard

The Standard, like the JN, is a two-seater biplane and was included in the general purchase. Eleven hundred of those machines were purchased and equipped with Curtiss OX-5 motors. This machine has readily adapted itself to commachine has readily adapted itself to commercial aviation. It has the general characteristics of the JN-4D. Its dimensions are: length, 26 feet, 7 inches; width, 43 feet, 10 9/16 inches; height, 10 feet, 10 3/16 inches. Its gross weight is 2,025 pounds and its useful load, 577 pounds. Its maximum speed is 68 miles per hour and its landing speed, 37 miles per hour. Its range at high speed is 235 miles.

## The Fairchild Camera Exhibit

The Fairchild Automatic Aerial Film amera exhibit is of great interest. This Camera exhibit is of great interest. device was described and illustrated comprehensively in AERIAL AGE for March 1st, 1920. Briefly this camera owes its origin to a demand for certain desirable improvements in the type "K" automatic film camera, adopted by the U. S. Air These consisted of a betweenthe-lens shutter, film spacing device, and exposure interval mechanism. The present model is a composite, and therefore attention is directed to the distinctively novel features, which are available for incorporation in new cameras of entirely original design.

## Flying Magazine

Flying Magazine will be represented by members of its editorial staff and will cooperate with all exhibitors in supplying authoritative information concerning for-

eign and domestic aircraft markets.

Flying was founded in 1911 by Messrs.
Robert J. Collier, Henry A. Wise Wood and Henry Woodhouse, to develop American aeronautics on the broadest scale

possible. Since 1911 Flying has done the pioneer work in getting:

1. Aerial Preparedness—Creating the public interest and urging Congress to make the large appropriations for aeronautics.

The creation of aerial reserves leading about 300 young men to learn to fly, some at private and some at their own expense to be available in case of an emergency-which found them ready when war came. Also creating the interest which led thousands of college men to join in the Army and Navy Air Services.

3. The establishing of the Aerodynamic Laboratories needed to conduct the researches necessary to develop better and safer aircraft. When Flying started and safer aircraft. When Flying started this campaign there were no aerodynamic laboratories in America.

4. Developing a sound and efficient aeronautic industry, obtaining the necessary government and public support for the industry in its various periods of development.

5. Developing safety in flying, both by explaining new devices and by publishing the advice of flying instructors.

6. Developing Pan-American aero-nautics with regard to the enormous business possibilities available by means of aerial transportation.

7. Introducing aeronautics in universi-

ties and colleges.

8. Developing aeronautic sport, which for close to four years was the Ameri-can aeronautic industry's best means of

Creating official and public interest in the use of aircraft for mail, commercial transportation and the transatlantic flight.

Standardization or accommune.Solving the most difficult problemsthey arose.

of the areonautic movement as they arose. 12. Establishing airways and aerial landing places across the continent, making airway maps, including the Wilson

airway.
13. Popularizing aeronautics by supply-

ing material for the press.

14. Pointing out how aircraft can be



The Dayton-Wright Model K-T Cabin Cruiser, equipped with Liberty engine



The Dayton-Wright Model O-W, equipped with Hispano-Suiza motor

used or will affect different lines of human endeavor, so as to bring about the use of aircraft for different purposes and secure the support and active interest of the leaders of different movements, sciences and industries to the aeronautic movement.

Flying has been the only magazine in the world that has given at all times complete pen pictures of the different aspects of the aeronautic movement, its prospective development and possible application of aircraft for different purposes.

## The Dayton-Wright Exhibit

The Dayton-Wright Company will exhibit several commercial models of which the following are the specifications:

The three-passenger Aerial Sedan Model OW-1 (equipped with the Hispano-Suiza "E" Motor) and its great supporting surfaces, affords all the safety and luxuries of the modern limousine of the road.

No pains have been spared in the refinement of all structural details, in that every component part has been designed and built to withstand many times the strain which the plane would be normally required to bear. Material for the wood construction is all carefully selected from properly seasoned, high-grade spruce—the ideal wood for aeronautical purposes. Infinite care is taken in the inspection of every part—metal, wire, wood and linen—before and after fabrication, assuring absolutely first-class workmanship.

For night flying the Holt Flare Lights on this ship supply ample illumination for landing.

This plane is especially adaptable to moderate cross-country flying, as it carries sufficient fuel capacity for approximately five and one-half hours continuous flying

The cabin is peculiarly suited for the most exacting passengers. The comfortable seats, luxuriously upholstered, require no cramping position; accommodations have been provided for necessary baggage, and absolute protection is afforded against the elements. The complete visibility of the cabin is another feature worthy of note.

The usual noise from the motor is completely deadened within the cabin, and conversation can be carried on in a normal tone of voice. This should appeal to the

time-saving man in transacting business with an associate while enroute, or the ranch owner with his superintendent taking a survey over his interests, etc. For pleasure purposes, the advantages of this machine are self-evident.

## Specifications General Dimensions

Wing span—upper wings46
Wing span—lower wings46
Depth of wing cord6' 6"
Gap between wings5' 67/8"
Stagger of wingsnone
Angle of incidence 3 degrees
Dihedral anglenone
Sweep backnone
Wing curve (modified)R.A.F. 15

Balanced rudder
Horizontal adjustable stabilizer
(2° positive)
Setting to line of flight (3°-30' negative)
Overall length28′ 9″
Overall height9'

Wings, upper, including ailerons
(2 wings @ 133.5 sq. ft.) 267.00 sq. ft.

Total supporting surface....534 sq. ft.

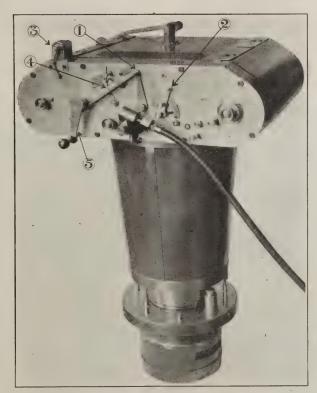


Fig. 1. Fairchild Automatic Aerial Camera

- Interval pointer which can be set to have the camera operate automatically at any interval between 8 seconds and 120 seconds.
- 2. Lever for adjusting shutter speed.
- 3. Counter showing number of pictures taken.
- 4. Pointer indicating whether or not the shutter is set.
- 5. Crank for the hand operation of camera.

### Weights and Loading

Net weight empty14	50 lb
Gross weight loaded24	
Useful load10	
Fuel, 70 gal. @ 5.95 lb417.50 lb.	
Oil (crankcase & tank)	
7 gal. @ 8 56.00 lb.	
Water (jackets & core)	
8.8 @ 8.33 73.50 lb.	
Pilot (average) 165.00 lb.	
2 passengers or other	
load 330.00 lb.	

1 otal1042.00 lb.	
Loading (weight carried per sq.	
ft. of supporting surface)	4.66 lb.
Loading per brake horepower	
Factor of safety	

## Power Plant

Hispano-Suiza, Model E, 180 H.P. 8 cylinder, 4 cycle Horsepower, rated at 1450 R.P.M. 180 H.P. (at sea level) Weight per rated H.P......3.61 lb. Bore & stroke 120 m/m x 130 m/m-4.724" x 5.118" (economical) 13 gal. per hr.
Oil capacity—tank and crankcase.7 gallons Oil consumption per hr. (economical) 0.5 gal. per hr. Nose radiator (Honeycomb Harrison type)

### Performance

Speed, maximum horizontal flight 95 miles per hr. (estimated) Speed, minimum horizontal flight 35 miles per hr. (estimated) Radius of action (economical fuel) 7.4 hours (estimated)

Radius of action (ecnomical fuel) 10.10 hours (estimated)

Oil capacity is greater than fuel capacity in comparison to radius of action. Provision for this was allowed due to variations

The six-hour cruising radius of the "KT" Cabin Cruiser makes this ship particularly desirable for covering greater distances at a higher rate of speed. The clear vision cabin with its comfortable seating arrangement affords all the conveniences of modern traveling.

This is purely a commercial ship and is built for either passenger or freight carrying; for the latter by merely removing seat provided for the passengers.

The high factor of safety is a prominent feature of the "KT" as it has in its construction the usual high grade Dayton-Wright workmanship.

It is powered with the Liberty Twelve 420 H.P. motor, giving a maximum speed of 120 miles per hour, most adequate for general use. The merits of this motor were proven in the great war, when machines equipped with them accomplished such wonderful results over the front when the reliability of the motor meant when the reliability of the motor meant so much.

## Specifications

## General Dimensions

Wing span—upper plane
Length of machine overall30' 19/16" Height of machine overall11' 2½" Angle of incidence3 degrees Dihedral angle3 degrees
Sweepback

## Areas

Wings, upper, including ailere	ons
	212.36 sq. ft.
Wings, lower, including ailer	ons
	214.36 sq. ft.
Center Section	14.37 sq. ft.
Ailerons (each 17.9 sq. ft.)	71.6 sq. ft.
Horizontal stabilizer	38.42 sq. ft.
Vertical stabilizer (fin)	6.00 sq. ft.

in lubricating oils. 105170

Passenger cabin of the Goodyear Pony Blimp

Rudder
Total supporting surface441.09 sq. ft. Loading (weight carried per sq. ft. of supporting surface) 9.3 lb.
Loading (weight per B.H.P.) 9.82 lb. Factor of safety 6

## Weights

## Performance

Speed-maximum horizontal flight 120 M.P.H. Speed-minimum horizontal flight 55 M.P.H. Climbing speed......10,000 ft. in 10 min. Radius of action (economical)....6 hours

### Motor

,	
	Model—Liberty 12 cylinder 4 cycle.
•	Horsepower rated at 1700 R.P.M420
3	Weight per rated horsepower21b.
3	Bore and stroke $5'' \times 7''$
)	Fuel consumption per hour
)	(economical) 21 gal.
	Fuel tank capacity
	Oil capacity provided13½ gal.

## The Goodyear Exhibit

The "Pony Blimp," perhaps the smallest practicable dirigible, is shown for the first time in the East by The Goodyear Tire & Rubber Company.

Turning from war-time to peace-time activities, the company that pioneered in lighter-than-air construction and has faith in its possibilities, will build dirigibles of various types for commercial use. It expects the Pony Blimp to be found adaptable for a variety of commercial purposes.

Designed primarily for the sportsman, this ship may be used for mail carrying, wheat and oil field surveys, topographical work over rough country, forest patrol, coast guard patrol and for serial photographical graphy. In war it can find use in scouting, observation, photography, artillery spotting and may possibly replace the kite balloon for naval use because of its greater independent mobility.

Only 95 feet long, 38 feet high and 28 feet in diameter, the "Midget of the Air" is about one-fifth the size of the widely used navy type of dirigible, having a gas capacity of only about 35,000 cubic feet. Its size, coupled with outher features, has given it an ease of manœuverability that delighted veteran pilots on its trial tests.

Motored with a four-cylinder, sixteenas a "pusher," the Pony Blimp showed a trial speed of about 40 miles an hour. It has a range of about 400 miles or 10 hours at cruising speed. Its "ceiling" is about 6,000 feet.

The handsomely finished streamline, natural mahogany finish car, is capable of seating two passengers, comfortably, but three may be carried with some sacrifice



The Cato Butterfly Model Sporting Monoplane (Described in Aerial Age for October 6)

in weight by carrying less fuel. Single control is arranged with a sliding wheel for the elevator, which permits the pilot to control with either right or left hand. The rudder is of the foot-bar type. The ship is equipped with all instruments necessary for cross country flying, all being located on the dash where they are handy to the pilot's eye.

When flying the "Pony Blimp," it is not necessary to return to the hangar at night as the special mooring harness per-

When flying the "Pony Blimp," it is not necessary to return to the hangar at night as the special mooring harness permits the ship to be safely moored in an open field by its passengers. An innovation of value in cross-country flying is its demountable feature. By removing a few pins, the car and rudder may be unshipped and the envelope may then be bagged close to the ground. Furthermore, provision is also made for landing on water by the use of a single inflated rubber pontoon located at the end of the shocks of ordinary landings.

The two 20-gallon fuel tanks are located on the side of the envelope and may be filled by a pump located near the pilot, thus eliminating the need of climbing above the tanks in order to take on gasoline.

The Goodyear company has started construction on another little dirigible of the

same type, except that it will be a tractor. But for a new type of engine and minor improvements to the car, it will be the same as the present model.

Other interesting features of the exhibit are moving pictures of a dirigible landing on the roof of a hotel to discharge passengers, the basket of the Goodyear II in which R. H. Upson and W. T. Van Orman won the National Balloon race of 1919, scale models of all balloons manufactured, gas containers, valves and accessories.

# The Horace Keane Aeroplane Co. Exhibit

The Horace Keane Aeroplane Co. are exhibiting their new single-seater model K-1.

This plane has been designed to provide a single-seater meeting a large popular demand for this type of machine, while the utmost simplicity has been used in the design, so that the selling price would be within the most reasonable limits. The same care and refinement, however, have been employed in this design as in the design of the most luxurious and costly large passenger plane.

The model marks a decided develop-

ment over the Ace built by the Aircraft Engineering Corporation, in the construction and sales of which Mr. Horace Keane was so closely associated, while its best features have been retained. The machine has more than ample structural safety, and the low landing speed, good climb and high speed, its small dimensions and folding wings enable it to be used in any landing field and to be stored in any garage, its manoeuvrability making it a very desirable craft.

a very desirable craft.

The motor employed is the well-known four-cylinder Ace motor in which many refinements and improvements have been introduced, so that it now has slightly more power and is perfectly reliable. The motor is a simple four-cylinder motor, with overhead valves, which is readily accessible in all its parts and can be run by anyone with the slightest knowledge of the ordinary gasoline motor.

The motor cowling is so designed that by taking out a couple of pins, every part of the motor and piping is immedately accessible.

The nose radiator of usual honeycomb type with  $2\frac{\pi}{2}$  sq. ft. frontal area will provide ample cooling, with the utmost simplicity of water connection. The gasoline system is the simplest possible; namely, a purely gravity one,—the tank



The Thomas-Morse twin-motored Trans-Continental Aerial Mail Plane



The Orenco Type F 4 Seater, equipped with Hispano-Suiza motor

being placed in the top cowling and having ample head over the carburetor. tank is solidly attached in the fuselage so that it will retain its position even in the most severe of landings.

## The Lawrance Engine Exhibit

The Lawrance Aero Engine Co. exhibit their Model L-2 three-cylinder air-cooled engine rated at 60 h.p. at 1,900 r.p.m.

The cylinders are of cast aluminum with cooling fins machined. Shelby steel liners with walls 1/16 inch thick are cylinder and the crankcase. Liners are case-hard-ened and ground, which gives them a very fine wearing surface.

Each cylinder is attached to the crank-

case by means of six studs.

Pistons are of cast aluminum alloy. Crowns are flat. Each piston has four concentric cast iron rings and one wiper ring on skirt.

Crankshaft is of chrome nickel-steel. It has a single throw and is counterbal-anced. The shaft is hollow for lubrica-

tion.

Front end of shaft is tapered to receive the propeller hub which is drawn tight by means of a differential thread nut. shaft is sturdy and of large dimensions throughout.

Connecting rods are of chrome nickel-steel. They are round, of constant sec-tion and hollowed for lightness. They are machined all over. Each of the three rods has a segmental shoe which floats in two grooves in the big end bearing.

Bearings are of cast bronze with Babbitt lining.

Wrist pins of nickel-steel float in both the rods and pistons. Bronze buttons on the ends of wrist pins keep them from working out sidewise.

Valve gear consists of three individual camshafts, each with two cans. The push rods are adjustable.

Lubrication is by means of pressure sup-

plied by a gear pump. Pressure is maintained at 25 pounds per square inch.

The oil is fed through the rear of crankshaft to the front cover where it runs to a check valve which maintains the necessary pressure. From this valve the oil drains back to the tank immediately below it. On the front cover plate the by-pass valve operates at a pressure of 50 pounds. It might seem that the two lower cylinders would obtain most of the oil but as a matter of fact it has been proven that the oil is evenly distributed to

the 3 cylinders.
Oil is consumed at the rate of .07 lbs. per h.p. per hour.

## The Liberty Starter Exhibit

The Liberty Starter Corporation is exhibiting their starting device for aero engines.

The design of this device possesses several features in construction and design which are of interest from an engineering standpoint. A single compact unit encloses both hand and electric starting, thus providing for any failure of the storage battery.

The unit is aligned directly with the crankshaft, thus relieving the shaft and main bearings of any strain. In effect, it

is part of the crank-case.

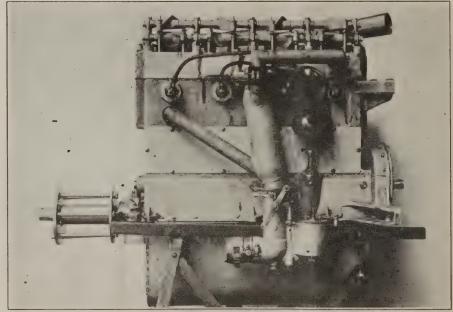
The starting unit is mounted on the cranking end of the motor, opposite the propeller. This does away with head repropeller. This does away with head re-sistance and eliminates the necessity for freakishly designed radiators. Being a single unit, and completely housed in metal, it is water and oil proof. Its weight, however, is about one-third less than any separate hand and electric starter not combined.

A comprehensive description of this starter was published in Aerial Age for September 29, 1919.

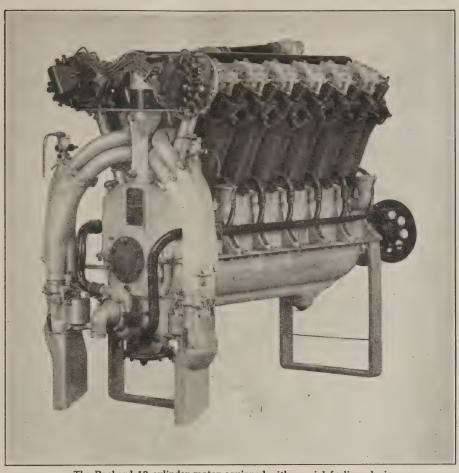
## The Orenco Exhibit

The Ordnance Engineering Corporation are exhibiting their new Type "F" commercial 4-seater plane.

The four-place tourister's most attractive feature is the double side-by-side seating arrangement that eliminates the feeling of isolation and lack of companionship usually associated with all planes of the tandem type. The pilot and



The Ace 4 cylinder motor exhibited by the Horace Kean Acoplane Co.



The Packard 12 cylinder motor equipped with special fuelizer device

his three companions enjoy the convenient placing that gives such security and comfort and the congenial chumminess it promotes. Although shrewdly designed to be as compact as possible, affording the maximum protection against the weather, the two upholstered cockpits are easily accessible.

Two passengers in the forward seats have plenty of room for freedom of movement, and for their protection an automobile type wind shield is mounted forward of the cockpit. The pilot and his companion in the rear cockpit are provided with two separate and complete controls that enable either to guide the plane. By this arrangement the pilot can observe just how the plane is being handled and can instantly resume control in an emergency or near the ground. In this manner the average person can quickly acquire the art of piloting the machine himself. The sportsman can give his friends a better appreciation of flight's mystery for they can actually see his movements and the corresponding manœeuvring of the aeroplane. Whether it is for the novelty or as a practical business proposition, the side-by-side seating arrangement has many definite points. The nicely streamlined body is pleasing

The nicely streamlined body is pleasing to the appearance and its finish is equal to the finest automobile both in attractiveness and serviceability. Parts are easily reached for making adjustments, repairs and installations. Main wings are identical in plan, Wing struts are all similar and interchangeable with one another, which means that only a limited number of spare parts are necessary. Standardization has been carried out wherever a duplication of parts would effect a saving, for new parts and fittings can always be promptly

procured with the assurance of perfect fit.

General dimensions of the Type "F" are as follows: Span of both upper and lower wings, 38 feet. Length, 24 feet 10 inches. Wing areas, 355 square feet; as the weight of the plane fully loaded is 2300 pounds, the loading per sq. ft., 6.48 pounds. With a 150 H.P. Hispano-Suiza engine, the loading per H.P. is equal to 15.2 pounds.

Carrying a pilot, three passengers, baggage and fuel totalling 955 pounds in



A detail view of the fuelizer attachment on the Packard Twelve

weight, the Type "F" can cover a distance of about 290 miles at the rate of 90 miles an hour. For shorter trips less fuel may be carried which will permit taking on additional luggage, etc. The gasoline tank under the forward seat has a capacity for 250 pounds of fuel; it is located at the center of gravity where a lightening of the fuel load does not alter the balance of the machine. All the seats are located close to the centre of gravity and whether carrying only the pilot or its full capacity of four persons, proper flying trim is always inherently maintained.

herently maintained.

In taking off for flight the machine leaves the ground after a run of about 200 feet, and in landing comes to a complete rest after a run of 300 feet. An altitude of 5000 feet is reached in 9 minutes, but with a lighter load the climb rate is much more rapid. Near the ground the speed range is 90-45 miles an hour. The slow landing speed is especially conducive to well chosen landings, and this, with the wide wheel track and generous shock-absorbers assure landings which neither strain the machine or jar the occupants even in fairly uneven fields. The large control surfaces and their ease of operation facilitate positive precision in all manœuvres.

### The Packard Exhibit

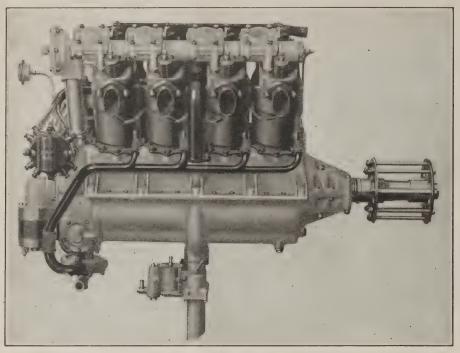
The Packard exhibit is confined to engines, which is the branch of aviation work in which the Packard Motor Car Company is chiefly interested. Three engine models are exhibited; the 1A-744, the 1A-1116, and the 1A-1650. The latter model is practically identical in its specifications with the famous Liberty, and is the only aviation engine the Packard Company has on the market at the present time.

An interesting feature of the Packard exhibit is the new fuelizer. Colonel T. G.

Vincent describes it as follows:
"When I left the Army at the close of the War I realized that this possibility of engine failure at a critical time was the most serious handicap faced by commercial aviation and I bent all my energies towards solving this difficulty. At the same time I had a somewhat similar problem to face in the automobile field with the low grade fuels which the enormous growth of the automobile industry compelled us to use. These heavy fuels were threatening the very foundations of the industry, engines were hard to start and harder to run, in cold weather. Spark plug fouling, carbonizing, faulty lubrica-tion due to kerosene diluting the lubricating oil and greatly increased wear and tear of the engine were the direct result of this fuel situation. This was a critical state of affairs and I recognized the similarity of the problems faced by the airplane engine, which when cold was ever treacherous and liable to fail at the critical instant and the automobile engine with all its ills brought about by heavy fuels. I devoted the extensive resources at my command to the dual problem and as a result of months of intensive day and night experimental work

the Fuelizer was evolved.

"The Fuelizer forms an adjunct to the carburetting system of an engine and has the duty of supplying exactly the amount of heat required to vaporize the fuel under all conditions. There had been many attempts to do this but they had all failed to accomplish what was really required. Maximum heat under low throttle conditions and minimum heat under wide open throttle coditions are



The Packard 8 cylinder motor

the fundamental requirements and the fuelizer accomplished this perfectly by very simple means. The fuelizer consists of a burner in conjunction with a miniature carburetor and automatically regulates the amount of heat supplied to the intake header without a single moving

part.

"This essential characteristic of proper heat control is arrived at by taking advantage of pressure conditions on either side of the engine throttle. A by-pass or shunt is provided around the throttle and this passage supplies the mixture of air and gasoline to the burner. After combustion has taken place in the burner the burnt gases join the main mixture which has gone by the engine throttle and an intense heat is imparted to the mixture. As the throttle is gradually opened there is less and less tendency for the mixture to take the by-pass through the

burner and consequently the burner gradually goes out of action and at wide open throttle it is supplying no heat at all to the mixture which is exactly the result aimed at.

"The influence of the fuelizer on an engine is immediately apparent and tests run day and night on the road under extreme climatic conditions varying from 100° in the shade to 10" below zero have proved the claim that the fuelizer makes an engine independent of seasonal changes, allows the use of much heavier fuels than we are using today with far better results than we have been accustomed to be in the past and removes all possibility of spark plug fouling, crankcase dilution and premature wearing out of the engine.

"I have already stated that the aeroplane engine faced a problem similar to the automobile engine except that the symptoms were somewhat different and the consequences oftentimes more serious. The application of the fuelizer to an aeroplane engine was my first thought when we had perfected the device for automobile use and the results were intensely gratifying. The Packard 1A-1650 Aircraft Engine which will be exhibited at the forthcoming Aeronautical Show in New York will give the public the first opportunity of inspecting the application of the fuelizer to an aircraft engine. In conclusion I do not hesitate to say that this final step towards preventing engine failure in the air should do much to popularize commercial aviation since it has reduced the possibility of engine failure to a negligible factor."

## John A. Roebling Sons Exhibit

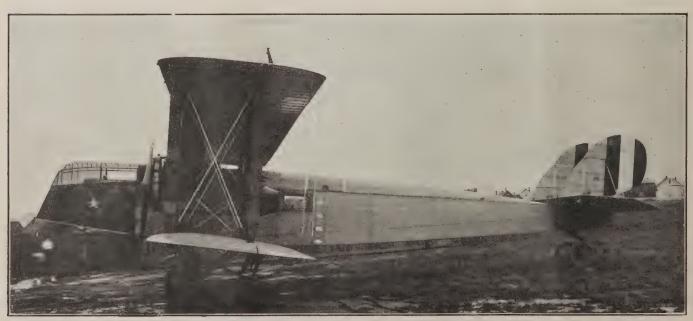
The John A. Roebling Co., of Trenton, N. J., will exhibit a complete line of aircraft wire, stranded cord, thimbles and ferrules, as well as all types and kinds of wire products and insulated wire as it applies to the aircraft industry. The exhibit will be arranged in a series of glass-covered cases, each of which will contain complete data relative to the products contained in it.

A novel feature of the exhibit will be a coil of wire possessing the higest tensile strength for any wire of its size and weight known in the world. It is 1/4 inch in diameter, 6x9 strand steel balloon cable, having a copper conductor in the center for telephonic communication. This wire is furnished to the United States govern-

ment for balloon mooring.

## The Stewart-Hartshorn Exhibit

The Stewart-Hartshorn Co., manufacturers of streamline wire, are exhibiting their products on panels, showing the nine stock sizes which they have supplied in quantity. The Hartshorn strap end, which is their exclusive product, has been submitted to most rigid tests and has shown a breaking strength in excess of 200,000 pounds per square inch for the wire for which it is designed. The wire itself



Glenn L. Martin 12 passenger Military Transport Aeroplane

775

has a breaking strength of 165,000 to 175,-000 pounds, which shows that the strap end will hold even if the wire is strained to the breaking point. DH-4 planes manufactured by the Standard, Dayton-Wright and Fisher Body Corporation and the SE-5 seaplane manufactured by the Curwith Hartshorn streamline wire.

The Valentine Company Exhibit

This company is exhibiting their full

tiss Company were exclusively equipped line of waterproof varnishes, which are extensively used on seaplanes and propellers. A feature of their exhibit is a propeller which is kept in motion in a glass tank of water, without there being any visible deleterious effect on the propeller varnish.

## FLYING POPULAR IN FLORIDA

RANSPORTATION by aeroplane is enjoying a tremendous patronage in Florida this winter, according to P. L. Freeman, Sales Manager of the America Trans-Oceanic Company, who has just returned from an extended trip to that State, covering all points on the East and West Coast as well as the interior.

At Palm Beach, where the principal ation of the America Trans-Oceanic station of the America Trans-Oceanic Company is located, this firm is operat-ing a converted Navy Curtiss H-16 twomotored flying boat which carries twelve passengers including pilot and mechani-

cian.

The H-16 is being used very successfully for overseas passenger flights, such as from Palm Beach to Nassau and Bimini in the Bahamas, to Long Key, Key West, Havana and points on the West Coast. Two Curtiss H-S single motored Navy

boats have been converted into six-passenger ships including crew and are in operation for coast work from Palm Beach to Miami, Palm Beach to Jacksonville and from Palm Beach to Bellaire on the West Coast.

Mr. Freeman made the latter trip from Miami to Bellaire on the West Coast. a distance of 325 miles, with one stop at Fort Meyer for gas and lunch in about six hours. Other means of transporta-

tion requiring the better part of 24 hours.

Not only is the coastal and overseas business good, according to Mr. Freeman, but dealers in Orlando, Lakeland and Fort Meyer are doing a splendid business. A number of landing fields have been established by the latter within a radius of 60 miles of these points, and in addition to making a great many joy hops, the inland dealers are making a number of short passenger flights up to 100 miles distance.

The operation in Florida of the H-16 type is really the first experiment in this country of a transportation operation employing a large machine. It has been watched with interest, and, according to Mr. Freeman, is not only practical but successful to operate these large planes at a rate of 30c per air mile per passenger.

It is certain that his firm will establish the problem of the period of the problem. New York Ne

regular lines between New York, New London, Newport and Boston, and from New York to Atlantic City; in fact, all points along both the Connecticut and the Jersey shores just as soon as the equipment of the Company comes North from Florida about April 1st.

A notable feature of the transportation business, and one that will be particularly interesting to the aeronautic industry, is the fact that a number of people have re-peated taking long flights, showing that it is not purely for novelty but rather both enjoyable and permitting quick communication between points.

At Palm Beach, the America Trans-Oceanic Company have established a mammoth hangar with facilities to achave established a commodate fifteen machines. Seven machines are now there, including Mr. E. R Thomas' four-passenger Curtiss flying

A regular schedule is maintained from the Company's hangars at Miami to Bimini. Four trips a week are made to this point and members of the Angler Fishing Club of Miami have found it very convenient as it enables them to leave Miami early in the morning; enjoy a whole day's fishing at Bimini and return about six o'clock.

In all overseas operations it is necessary to obtain clearance papers for the flying boat the same as those required by steamships and all passengers must have passports. This obstacle has been reduced by the Company so that the entire formalities can be dispensed with in less than one hour; that is, a passenger's photograph made, passport obtained and clearance papers for the flying boat properly filed.

## To Show Aeroplane at Indianapolis

Indianapolis has started to build its greatest motor car show, March 8 to 13.

For the first time in the history of an

Indianapolis show, an aeroplane will be exhibited as a commercial vehicle of the air, the Indiana Aviation Co. of Kokomo having arranged space for the "Oriole," one of the Curtiss models.

## Murphy Fliers in the South

Memphis, Tenn.-The Murphy Aircraft Company is operating two aeroplanes in the South, carrying passengers and giving exhibitions.

Plans have been inaugurated by the company whereby it hopes to make the coming season top all others. The opening will be in March at the Mardi Gras, New Orleans.

## Plan Aviation Field in Akron

Akron, O.-Establishment of a modern aviation field and the purchase of a fleet of aeroplanes is being considered by the Aeronautics Committee of the Akron Chamber of Commerce, it is announced by W B. Wanamaker, chairman. The committee will start on a small scale to build up an organization and construct a field to make Akron one of the regular stops in aviation routes tentatively map-



The service station and hangars of the America Trans-Oceanic Company at Palm Beach, Florida, and a number of their passenger service flying boats

THERE HAS
NEVER BEEN
A PERSON
HURT IN A
LAWSON
AIRPLANE



HERE IS A FACT — AN ACTUAL PHOTOGRAP LAWSON AIRLINER PASSING OVER NEW YORK TRIP FROM MILWAUKEE TO WASHINGTON

LAWSON AIRLINE COMPANY

# CREATOR OF THE AIRLINER



FACTS
ARE
BETTER
THAN

FANCIES

OF THE GREAT <u>26</u> PASSENGER CARRYING ARBOR ON ITS 2500 MILE HISTORY MAKING D RETURN.

MILWAUKEE, WISCONSIN, U. S. A.

# REPORT OF LATEST CONGRESSIONAL INVESTIGATION OF BILLION DOLLAR AIRCRAFT EXPENDITURES

(Continued from last week)

## Findings of Justice Hughes and Attorney General Gregory

No unprejudiced man will question the judgment of President Wilson in appointing Justice Hughes to investigate and report why our aviation branch of the service has been a failure. No intelligent man will question Justice Hughes' ability, thoroughness, and fairness as disclosed by his voluminous report found on pages 3712 to 3806 of the record. With his conclusions of incompetence and inefficiency in American aircraft production there can be no reasonable difference of opinion, and this committee recommends a careful reading of that exhaustive report to anyone who desires to know the appalling record of orders and counter orders, ignorance and bickerings, waste and extravagance, evidences of self-interest, and of improper practices disclosed. A condensed extravagance are report of certain important findings in that report densed statement of certain important findings in that report is attached, as Addenda A, to this report.

Justice Hughes' conclusions were agreed to by the chief legal adviser of the Government when, on October 31, 1918, or 12 days before the signing of the armistice, Attorney General G. W. Gregory supported the Hughes report (p. 3706). No higher authority need be offered by any committee to support findings and conclusions of incompetence and inefficiency than the reports of Justice Hughes and of the Attorney General of the United States.

## Findings of the Thomas Senate Committee

The Hughes hearings were conducted behind closed doors, so that in May, 1918, the Senate Committee on Military Affairs, acting nevidence of gross inefficiency and failure Affairs, acting on evidence of gross inefficiency and failure to get results in aviation, appointed a subcommittee—over a year after America's entry into the war—to investigate the aircraft situation. That committee consisted of Senators Thomas, of Colorado; Reed, of Missouri, and Hoke Smith, of Georgia, Democrats, and New, of Indiana, and Frelinghuysen, of New Jersey, Republicans. It held exhaustive hearings for several months, covering over 1200. haustive hearings for several months, covering over 1,200

Unwarranted political charges of partisanship or of prejudice may have been made against this committee, against Justice Hughes, or against Attorney General Gregory, but if so no intelligent man will question the ability and absolute fairness of the strong Senate subcommittee, a majority of whose members were Democratic Senators of national reputation, and who were demanding air protection for our coun-

try and for our forces overseas.

## An Unanswerable Indictment of America's Aircraft Production Record

The Senate committee's report, made to the Senate late in August, 1918, is found on pages 3693 to 3706 of the record and, like the Hughes report, is there printed in full because of its definite criticisms as to inefficiency at a time when of its denante criticisms as to inemciency at a time when our country was engaged in the mightiest struggle of all history. In view of the necessity for careful statement, plain speaking, and unquestioned authority during times of war, the Thomas Senate subcommittee report is astounding in character and certain in its conclusions. Quoting an extract from that report, we find stated (p. 3693):

On April 6, 1917, the United States entered the war. On June 8, 1917, public announcement was made that a great fleet of 25,000 aeroplanes was about to be created and would be decisive of the war months before an effective Army could be put in Europe.

July 24, 1917, Congress appropriated \$640,000,000 to carry out the aircraft program. The fund has been either by actual expenditure or by commitments exhausted. A further appropriation of \$884,304,758 has been found necessary.

In the opinion of the committee a substantial part of the first appropriation was practically wasted, while an Army of three and one-half million men has been raised, the aircraft situation is as follows:

(a) Six hundred and one De Haviland 4s have been embarked for France up to August 1, 1918. Of these 67 reached the front by July 1.

(b) We have not a single American-made Chasse or bombing plane upon the battle front.

(c) We have not a single American-made heavy bombing plane upon the battle front.

(d) We have not developed or put in quantity production a successful Chasse or fighting plane.

(e) Our attempt to create a fighting plane was centered in an attempt to adopt the Bristol fighter and De Haviland to the Liberty motor. The Bristol was, without sufficient tests, put in quantity production, over

\$6,500,000 expended and the lives of several gallant men sacrificed, when the machine was condemned and its manufacture discontined.

(f) The Standard J training machine was equipped with the Hall-Scott engine and put in quantity production. After more than 1,200 had been manufactured at a cost of \$6,000,000 the machine thus equipped was condemned as dangerous and placed in storage.

was concenned as dangerous and placed in storage.

(g) The Spad is a Chasse or fighting plane of the highest type. Early in September an oral order was given to the Curtiss Aircraft Corporation for the manufacture of 3,000 of these machines. Work was at once begun and drawings practically completed. October 8, the contract was canceled, the reason given being that the single-seat fighter was regarded as obsolete. But the fact is that on April 23, 1918, a contract was let to the Curtiss Co. to build 1,000 single-seat fighters known as the SE 5, which is the English equivalent of the French Spad.

(i) The cancellation of the Spad contract and the fighter seat of the fighter of the fighter

which is the English equivalent of the French Spad.

(i) The cancellation of the Spad contract and the failure of the Bristol left us without either a single or two-seated fighter. . . .

(k) As early as the month of October, 1917, we were in possession of the necessary facilities to construct the Caproni, a powerful and successful heavy bombing plane, approved both by Italian and English aeronautical engineers. Expert Italian engineers have been upon the ground since the month of January, yet the fact remains that we have up to date constructed only one experimental machine, which is equipped with Liberty motors.

(l) The Handley-Page heavy bombing machine furnishes another example of delay. Plans were furnished the Signal Corps in the summer of 1917, but were not availed of . . . A sample plane ordered in March, 1918, was flown last July. Tests are not yet complete.

The foregoing record of our tragic failure in aircraft production, as determined by a Senate committee late in August, 1918, shortly before the end of the war, is here submitted, together with the caustic report of Justice Hughes and Attorney General Gregory made late in October, 1918. These nonpartisan, impartial, and vigorous reports show the deplorable conditions existing in our aircraft program just prior to the armistice and after an expenditure or commitment on contract at that time of a large part of the \$1,000,-000,000 eventually spent.

## America's Humiliating Airplane-production Record

Undisputed facts found by the Thomas Senate committee disclose that on August 1, 1918, about 16 months after the declaration of war, 67 DH-4 observation planes—America's only contribution—had reached the fighting front. On Noonly contribution—had reached the fighting front. On No-yember 11, 1918, three months thereafter, when the war ended, the 67 DH-4 observation planes in operation on the front had increased to 213 (p. 190). Apart from 527 foreign machines begged, bought or borrowed from our Allies, whether up to date, obsolescent or obsolete, it is conceded America only had 213 observation planes of American make on the front No-vember 11, 1918 (p. 178), with which to supply 1,250,000 American soldiers then on the battle line (p. 186). The French, after many losses in battle, had 3,321 planes for their 1,500,000 French soldiers then on the line, an insufficient num-ber, but 15 times as many, proportionately, as those of Ameri-can make.

The British had 1,758 planes for their 900,000 men, or a slightly less proportion (p. 170). The Germans, though hard pressed toward the end, with many destroyed machines, still had 2,730 planes on the line (p. 170). The 527 foreign machines used by American aviators at the front, whether obsolete planes or otherwise, were borrowed or bought from our corely proceed. sorely pressed Allies, who needed them, if serviceable, for their own use.

In response to the contention of apologists that Allied planes were used to protect American soldiers, the patent fact remains that the Allies were short of planes, and if the planes which we received from them were of any value, then, in helping America, they necessarily weakened themselves.

## Testimony from America's Greatest Aviator

The following, from America's greatest aviator, Eddie Rickenbacker, tells the actual situation at the front during the momentous summer of 1918. Rickenbacker's book was recommended to the committee by Secretary of War Baker. Rickenbacker and Meissner, two of America's best fighters and best judges of fighting planes, both testified before the committee confirming conditions graphically contained in the book, and Rickenbacker said that statements set forth in his book were absolutely true and based on accurate data made by him at the time. by him at the time.

On page 14 he says (p. 196 of the record):

The Germans . . . had seen the spring months pass, and instead of viewing with alarm the huge fleet of 20,000 aeroplanes sweeping the skies clear of German Fokkers they had complacently witnessed the Fokkers occupying the air back of our lines whenever they desired it with never an American plane to oppose them.

Of equally thrilling interest are his vivid descriptions of our air helplessness on pages 197 and 198 of the record.

Again he says (p. 119 of his book):

From the frequency of accidents to our Nieuport it may be wondered why we continued to use them. The answer is simple; we had no others we could use. The American Air Forces were in dire need of machines of all kinds. We were thankful to get any kind that would fly. The French had already discarded the Nieuport for the steadier, stronger Spad, and thus our Government was able to buy from the French a certain number of these out-of-date Nieuport machines for American pilots—or go without. Consequently, our American pilots in France were compelled to venture out in Nieuports against more experienced pilots in more modern machines. None of us in France could understand what prevented our great country from furnishing machines equal to the best in the world.

Many a gallant life was lost to American aviation during those early

Many a gallant life was lost to American aviation during those early months of 1918, the responsibility for which must lie heavily upon some guilty conscience.

The German Fokker, Rickenbacker said, was superior to any fighting plane possessed by the Allies and far excelled the discarded French Nieuport or even the French Spad (p. 3649-3650).

Col. Patrick, when before our committee, speaking of Rickenbacker, says (p. 197):

He had 26 victories, I think. I decorated him. I gave him the distinguished service cross.

Disclosing our complete helplessness in the face of the enemy, Rickenbacker again says:

The truth is that not one American-made fighting machine came to the front until the war was ended (p. 197).

## Reckless Blundering of Responsible Officials

Responsible American officials who refused to have manufactured recognized types of fighting machines then in service; who recklessly blundered with attempted quantity provice; who recklessly blundered with attempted quantity production of the worthless Bristol that could not carry the Liberty motor; who canceled the 3,000 Spad order given our factories in September, 1917; who ignored Gen. Foulois' request from France early in July, 1917, for 800 SE-5's, 800 Spads, 800 Sopwiths, and 8,000 specifically named fighting machines like planes then in use (p. 360-670); who ignored the request of Gen. Mitchell and the French Government (p. 2614-2617) for planes and aviators, have not suffered from "guilty conscience," but have sought to justify their record of mistakes and their appalling inefficiency with flimsy excuses. of mistakes and their appalling inefficiency with flimsy excuses.

Swivel-chair experts have declared to our committee that American aviators were furnished similar machines to those used by our Allies and that the 213 DH-4's eventually furnished by America's expert designers on the front were the equal of machines possessed by the Allies or by the enemy. Chief Ace Rickenbacker, Meissner, Archibald, Gen. Mitchell, Gen. Kenly (p. 3496), and many others have nailed such untrue statements in their testimony (pp. 2623, 3498), while many other authorities have shown the uselessness of the DH-4 in any real fighting.

Like the promised 20,000 to 25,000 American planes, fabrications regarding production were used to deceive the Americations regarding production were used to deceive the American people; but those at the front in France, who were meeting great odds, knew the truth. A billion dollars for aircraft, a large part of which the Thomas committee found to have been wasted, was a miserable record, but of little importance compared to Rickenbacker's brief comment, "Many a gallant life was lost to American aviation . . . the responsibility for which must lie heavily upon some guilty conscience." The Hughes and Thomas investigations have placed the facts be-Hughes and Thomas investigations have placed the facts before the country for consideration of those who ungrudgingly raised a billion dollars that our troops might be protected with aircraft. Congress appropriated every dollar; asked for, according to Gen. Squier (p. 3590), and with this record of failure, Col. Deeds, Director of Aircraft, who had been removed and who had been recommended for court-martial by Justice Hughes, was banqueted in Washington by Chief Signal Officer and other admirers for the kind of record he had Squier and other admirers for the kind of record he had made (p. 59).

Rickenbacker repeatedly describes the helplessness of the DH-4 on pages 197 and 198 of the committee record.

## "Flaming Coffins" Furnished American Aviators

What more fearful arraignment can be offered than the following description by Rickenbacker of their helplessness in action (p. 198 of record):

From every side Fokkers were piquing upon the clumsy Liberty machines (DH-4's) which, with their criminally constructed fuel tanks, offered so easy a target to the incendiary bullets of the enemy that their unfortunate pilots called this boasted achievement of our Aviation Department their "flaming coffins." During that one brief flight over Grand Pre I saw three of these crude machines go down in flames, an American pilot and an American gunner in each "flaming coffin," dying this frightful and needless death.

Equally vivid is the following brief, bitter experience that needs no additional explanation. Capt. Sweeney, an American engineer, testified before our committee as follows (p. 1354):

On the 22d of August, 1918, in Clarmont, France, about 16 men (American aviators) were lined up that had been ordered to the front. I think there were about four or six DH-4 machines, and the rest were French machines. They were second-grade machines. The French did not give the first-class machines to the Americans. They shook hands with everybody and said, "Well, this is not au revoir, this is good-by." Capt. Williams (in charge of the aviation group) and I were standing opposite, and I asked him why all this gloom. He said, "Well, those American machines have no protection. As soon as a bullet hits that gasoline tank it is certain it will take fre immediately, and the men—the pilot and observer—have no chance to get away." He said the boys called those "flaming coffins."

Mr. MAGEE. Sure death?

Capt. Sweeney. I presume so. I did not ride in any of them, Mr. MAGEE. What did he say about that—the captain in charge?

Capt. Sweener. He said they would not come back; that when one of the machines was struck it was the finish. The French machines were old and not up to date. They were not as fast as the German machines and, therefore, they did not figure they had much chance in these machines, either. I saw Capt. Williams about a month afterward and asked him particularly if those fellows came back. He said he had never heard of any of them. He said they had fallen inside the German lines and had been captured or killed.

Capt. Sweeney's statement and Rickenbacker's vivid scription can be fully understood when nine men were killed in 39 unconverted DH-4's in the recent October transconti-nental races and many other DH-4 machines like those we sent to France were wrecked or damaged, which in battle would have meant certain death or capture to the flyers engaged.

## Responsibility Fixed for Use of "Utterly Unsafe" Planes

In spite of wanton waste of lives, these DH-4's, the only American-made planes that reached the front, were kept in production after their dangerous and clumsy construction was a matter of common knowledge. The last Director of Aircraft, Mr. John D. Ryan, just prior to his long European trip with Secretary Baker in August, 1918, testified before the Thomas Senate subcommittee a few weeks after he had canceled the order for the utterly useless Bristol that could not carry the Liberty motor. The following testimony is from Director Ryan on the DH-4. His responsibility for aviation and needless waste of life was then being weighed by that committee:

Senator Reed. You know that the best and most experienced flyers, a number of them in this country, have testified before this committee that they regard the DeHaviland machine as utterly unsafe and that they would refuse to go up in it or send subordinates up in it?

Mr. Ryan. I understand that some have testified that they have refused to go up in it or let subordinates go up in it.

Senator Reed. You propose to go on making the De-Haviland 4 machines?

Mr RYAN. Until we can put the DeHaviland 9 in production.

Senator Reed. Do you intend to do that regardless of any testimony that may be given by experienced flyers that the machine is utterly unsafe?

Mr. Ryan. I am not convinced that the burden of testimony of the flyers throughout the country is that the DeHaviland 4 is an unsafe machine (p. 42).

This testimony is taken from the official record of the Thomas Senate committee hearings to show the purpose of responsible American aircraft production officials from Squier and Deeds, at the beginning, and down to Ryan at the finish, to keep manufacturing for use of American aviators the "utterly unsafe" DH-4. Equal responsibility rests with the head of the War Department, who was informed of the facts—for Secretary Baker, who approved the Squier program at the outset, was before the Thomas committee in August, 1918, when the following startling statement was made to him by a Senator of that committee:

a Senator of that committee:

Senator New. It is a fact that every flyer that we have had before this committee as a witness, including several who have seen long service abroad, both with our own forces, the British forces, and the French forces, have testified that the DeHaviland 4 machine, with the defects appearing in it as it has been produced at the Dayton-Wright factory, is highly dangerous and ought not under any circumstances be used; and at least one officer has testified that he would no longer send men up from his field in a machine of that type until after these defects had been remedied. In view of that condition, as it has been expressed and recorded by the men who are best qualified to pass upon the conditions and quality of that machine, I at least think that it was a very great error of policy and judgment to have sent them forward before these mistakes were corrected, and I wanted to know whether or not you agreed with that view?

Mr. Baker. The subcommittee, of course, has a great advantage over me in that I have not been permitted to see any of the testimony the committee has taken, so that I do not know anything about this concurrence of opinion to which you refer.

Senator New. I am telling you now what that opinion is (p. 34).

More specifically, Secretary Baker testified before our own committee, July 31, 1919, as follows (p. 42):

Secretary Baker. Mr. Ryan and I talked over the general question

Secretary BAKER. Mr. Ryan and I talked over the general question and I approved that we should not suspend making any machine we were then making, but we should go on and make it and get ready to make others.

This was Mr. Baker's judgment when the only machine apart from training planes then or thereafter produced by the United States was the "utterly unsafe" DH-4 plane.

Secretary Baker and Mr. Ryan, his appointee, were both faced by the Senate committee with these facts, which were pressed upon them when they sailed together for Europe in August, 1918, at which time Mr. Ryan declared to Senator Reed that he proposed to go on making the dangerous DH-4's.

# Thousands of Unsafe Planes Built with Full Knowledge of Their Defects

Many combat flyers testified before the Hughes investigation, the Thomas committee, and this committee regarding the unsafe and clumsy DH-4 planes, but not one witness out of the 740 American flyers at the front has been found to defend its use for fighting purposes in battle.

One thousand and ninety-seven of these DH-4 machines, which Rickenbacker called "criminally constructed," were produced in October, 1918, alone at a cost of ten to fifteen millions of dollars, and they were kept in production up to the end of the war. A certainty exists that fatalities among American aviators would have largely increased but for the failure of Gen. Pershing to receive more than 213 of these DH-4's with which to face the enemy.

Good judgment was displayed when over 1,000 DH-4's were scrapped and burned in France after the armistice, whereas we brought back 1,000 used and unused foreign planes, including about 300 obsolete Nieuports and Sopwiths, discarded by the Allies long before the end of the war (p. 3317). "Very few of these were new," and yet were sent here in preference to the "utterly unsafe" DH-4's (pp. 3317-3320).

Gen. Pershing's cablegram (p. 203), showing over 50 defects in DH-4 planes received by him in Europe, specifically indicted the clumsy, dangerous machine, and apart from the 213 used at the front the remainder of the DH-4's were put to better use by being kept boxed and stored in this country as coffin-shaped monuments to official stupidity and criminal stubbornness.

Sending American aviators into action with these DH-4's was more wasteful of human life even in the hands of the best-trained aviators than it would have been to equip shock troops, with wooden guns. American aviators made a name for American valor, courage and skill, although equipped with second or third rate machines, as described by the different witnesses. Individual aviators stood out brilliantly, but with all their bravery, which was emulated by their comrades on the ground when going over the top, the fact remains that nothing injured the morale of flyers, or of the soldiers whom they were protecting, more than knowledge that their machines in use were discarded French Nieuports or unsafe American planes far inferior to machines then in use by the enemy (pp. 3649-3652).

## Misleading Production Figures

Testimony was placed before the committee relating to production figures, actual and prospective. Estimates were frequently measured by the imagination of witnesses, while grossly misleading evidence, confusing to the average mind, shows that anything may be proved by figures.

As stated, Secretary Baker testified in effect before our committee that at the end of the war we had not a single American-built fighting or bombing plane at the battle front, and Col. Patrick stated that the only machines in use at the front by Americans were 527 foreign bought or borrowed planes, supplemented by 213 observation DH-4's (p. 178).

Gen. Pershing testified before the Joint Military Committee that we never had any American-built fighting plane at the front, yet we find Assistant Secretary of War Crowell, in a report on American munitions (p. 243 of report), giving figures that carry a wealth of misinformation characteristic of similar testimony placed before the committee and before the country. He says:

On the day the armistice was signed we had received from all sources 16,952 planes. Of these, 5,198 had been produced for us by the Allies.

Of 11,754 planes claimed to have been built in America, according to this same authority, we had produced "3,328 fighting planes." That is his statement,

## Drawing on Our Exhausted Allies

Mr. Crowell includes Penguin wooden "grasshoppers" in his list of "planes" and also scores of worthless Bristols and 1,660 condemned Standard J training planes (p. 3769), together with other similar disastrous experiments, including 4,000 "utterly unsafe" DH-4's, in order to reach the figures

contained in his remarkable statement; but when he states that "3,328 fighting planes" were produced in America, the astonishing error is manifest.

Rickenbacker's brief statement is undenied (p. 197): "The truth is that not one American-made fighting machine came to the front until the war was ended." Secretary Baker, Mr. Ryan, Gen. Pershing, and all other witnesses before all the committees agreed to this proposition. Neither 3,328 nor any American-made fighting machines were produced for use before the end of the war, but Mr. Crowell's statement calls to mind a most pitiful picture of our own inefficiency during the war when he says that 5,000 planes of various types, largely training, including over 2,000 obsolete Nieuports and Sopwiths, were purchased from the Allies during the war, equal in number to the total real fighting planes on the front owned by France and England combined. Bleeding France and exhausted England, with their backs against the wall, with reserves strained to the utmost limit, were called on to furnish planes to the opulent, prosperous United States that had raised a billion dollars for planes and then had to depend on the Allies for 527 fighting planes, including Nieuports and Sopwiths—all that we could get—because of our own failure to produce. Gen. Pershing testified that we were short of both fighting planes and training planes. Criminally short, he might truthfully have added.

The picture is humiliating when we contemplate the efforts of our Allies to provide planes for their own protection, as disclosed by the testimony, and by their payment to us per thousand feet on a 10 per cent salvage basis, of \$802.20, \$287.20 and \$895.20 for spruce, fir and cedar, respectively, which was used by them in building planes for our mutual defense (p. 2304), while many of our own factories were standing idle, according to the Hughes report.

We had the factories, men and money, and might have turned out planes at a wholesale rate, when the uselessness of DH-4's in battle was demonstrated at the outset, but that was the only American machine ever produced for use at the front.

So much for the record of American aircraft production during 19 months of war. If the war had lasted two or three years longer and until responsible American officials decided to build Spads, Capronis, and real fighting machines, without constantly canceling orders, we might have shown results. Production of all Army planes, apart from DH-4's, in January, 1918, reached 744. Seven months afterward, during strenuous war needs, American production reached 489 planes in August, 1918, or a loss of about 35 per cent compared with the month of January.

## American Airplane Production-1918

(P. 518.)

	' <u>'</u>
January 744	June 448
	July 666
March 934	August 489
April 728	September 450
May 598	

The foregoing does not include the "quantity production" of DH-4's, but it does include all training planes, "sea sleds" and several hundred Penguins, or what are known as wooden "grasshoppers." It also includes 1,660 discarded worthless Standard J planes, described in the Thomas committee report, and scores of Bristols, also discarded. About 4,500 useless DH-4's were paid for by the United States at a cost of over \$50,000,000.

The following statement gives comparative production of airplanes in Italy, France, England and United States by months from January 1 to September 30, 1918, according to testimony of Gen. Menoher, Chief of Air Service.

Total production of airplanes in Italy, France, England, and United States, by months, from Jan. 1 to Sept 30, 1918

	Italy	France	England	United States*
1918				
January	305	1,484	2,347	729
February	349	1.615	2,288	734
March	189	1,609	2,587	938
April	161	2,150	2,107	743
May	291	2,023	3,051	751
June,	435	2,262	2,650	784
July	459	2,595	3,474	1.150
August	365	2,857	2,279	713
September	374	2,238	2,726	1,207
Total	2,928	18,833	23,509	7,749

<sup>\*</sup>The apparent discrepancy in American airplane production shown by the two tables is due to the DH-4's, which are included in the second table.

## Wasted Three to Five Months

March 13, 1918, Gen. Pershing cabled Gen. Squier:

Approximately 700 cadets in Europe awaiting flying training. These cadets have already wasted from three to five months for training and it is estimated some of them will have to waste at least four months before their training can be commenced. . . These conditions have produced profound discouragement among cadets (p. 3751).

The whole country was becoming discouraged with Squier, Deeds, et al., and no relief ever in sight.

Vice-President Keys, of the Curtiss Co., sets forth some of the contradictory orders received (pp. 3481-3483) while 789 changes were made under orders of the War Department in the attempted production of the discate this one from manual contractions of the contraction of the discate this one from manual contraction. lowing testimony is illuminating regarding this one firm manufacturing planes:

Mr. FREAR. How many men were you employing?

Mr. KEYS. 18,700.

Mr. Keys. What was your possible production capacity?

Mr. Keys. Our plant was designed for a maximum of 100 machines a day of any type small machines. . . . We contracted in September, 1918, to deliver 100 machines (fighting planes) a day (pp. 3456-3457).

The Curtiss firm received an order for 3,000 fighting "Spads" on September 19, 1917. The order was canceled November 7, 1917 (p. 3755). But this one factory could have produced 30,000 fighting planes a year, according to Keys, if given a free hand.

Borglum stated several months before the Hughes investigation was started that at the Curtiss plant 13,000 or 14,000 people were on the pay rolls (cost olus) and "it has been suffering from 60 to 70 per cent idleness. Very much the same conditions prevail at the Standard Co." (p. 27). All were waiting for orders from the experimenting experts.

Gen. Squier, before the Senate Military Committee, January 30, 1918, explained his own state of mind at that early date when he said:

I think we shipped no training planes to France at all. It is looming on the horizon that we may be producing more than we can get across and thereby be upsetting industry (p. 24).

## Upsetting Industry

Gen. Squier's statement before the Senate Military Committee was made shortly before Gen. Pershing cabled to him that 700 flying cadets had been from three to five months delayed in their training because of absence of planes.

While Gen. Pershing, Gen. Mitchell, Maj. Foulois, and others in France were frantically calling for planes with which to train and fight, Gen. Squier was calmly studying "the horizon" to discover whether we should "upset industry."

"Upsetting industry" has been a besetting fear with the War Department, which made eight hours a day's work for soldiers on the coast. It has salvaged airplanes, copper, trucks, and all other properties, including foodstuffs in a manner not to upset industry. It has frequently sold back for a song articles produced under Government contract, to the original producers in order not to "upset industry." Airplanes costing the Government \$20,000,000 were resold to the Curtiss factory for \$2,700,000, or about 13 per cent of cost. Thousands of American aviators were compelled to buy at full price from the Curtiss Co. if they wanted these machines.

In his final report to the Secretary of War, evidencing the failure to receive American planes, Gen. Pershing says (p. 76 of report):

In aviation we were entirely dependent upon our allies. . . . Without going into a complete discussion of aviation material, it will be sufficient to state that it was with great difficulty that we obtained equipment even for training.

Nothing need be added to this significant statement of failure of responsible officials in this country to provide airplanes.

America's aviators, with all their handicaps through poor planes, are described as follows by the same high authority:

As to our aviators, many of whom trained with our allies, it can be said that they had no superiors in daring and in fighting ability. During the battles of St. Mihiel and Meuse-Argonne our aviators excelled all others. They have left a record of courageous deeds that will ever remain a brilliant page in the annals of our Army.

## Hughes and Thomas Committee Reports

This committee has embodied in its hearings as exhibits the hearings and reports of Justice Hughes and of the Senate subcommittee, because early in the investigation it was determined to avoid duplicating hearings and overlapping of investigations so far as possible. With that purpose in view, your committee has accepted the conclusions based on specific facts of the two other investigations with a belief that the desire of the House is to have facts brought down to date,

together with an investigation of the spruce situation, which was suggested in the Hughes report. The Maj. Ray spruce was suggested in the Hughes report. The Maj. Ray spruce investigation, and various hearings in other investigations, are also herein referred to.

The Hughes report fixed responsibility on certain officials, from Gen. Squier and Deeds down to subordinate officers, and recited failures in measuring up to requirements. The Thomas Senate committee report devoted brief consideration to individual inefficiency, but pointed out the disastrous policy pursued in sacrificing everything and subordinating all energies to perfecting the Liberty motor.

In the judgment of this committee both the Hughes report and the Thomas report reached correct conclusions, and it is not necessary to reiterate those conclusions; but responsibility for failures should be chargeable to those at the top who permitted inefficiency and stupidity to govern what ought to have been a vigorous branch of our military program. Addenda A in part 2 of this report gives an extended summary by Justice Hughes of production figures and other data down to October, 1918.

## Official Responsibility for Aviation Failures

A sufficient warning was given the department by Gen. Squier before the Senate Military Committee, January 30, 1918, when he said:

We had to make a momentous decision back in April, 1917, when we decided to make the Liberty motor. . . . We had to throw the die. I think we did right. We had to decide whether we would go over to England and get those planes and engines and try to produce them or try to pool everything we had. That decision was taken boldly, and I think it was a very wise one (p. 23).

Justice Hughes' report says of Gen. Squier (p. 3773):

The duty of providing an adequate organization for aircraft production was left to the Signal Corps. It is quite clear that this undertaking was beyond the competency of the Chief Signal Officer.

This reckless, foolish policy threw aside every tried life preserver, every efficient air weapon used by all other countries after 30 months of war, and resulted in disastrous blunders and inexcusable delays, when delays meant unnecessary loss of life and possible loss of battles. Gen. Squier threw the die in April, 1917, and pooled everything for the Liberty motor experiment, which was used in the hopeless DH-4's, ignoring all other weapons.

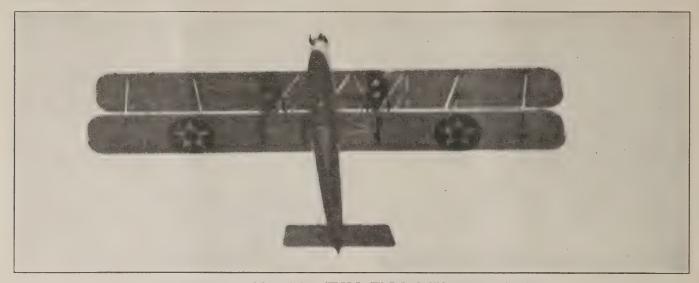
Secretary of War Baker, while before our committee, said he approved Gen. Squier's course when he responded, "That was my judgment at the time and still is my judgment" (p 23).

On Secretary Baker's shoulders must rest equal responsibility for failure to procure other engines and other planes when pooling all energies in the Liberty motor. Thousands of workmen were idle in airplane factories waiting for work, while Europe shouted for planes. Gen. Squier was finally relieved from active production about the time he testified before the Senate committee after nine months of valuable time had been wasted. All energies continued to be bent in building the useless DH-4, as shown by Director Ryan's testimony previously cited, and the same disastrous policy was thereafter pursued to the end of the war and approved by Secretary Baker (p. 42).

It is not the province of this committee to declare the measure of responsibility of any official, but we would be derelict in duty if we failed to present to the House what we believe to be the causes for America's aviation failure and the resulting lack of confidence in any present War Department aviation plans.

Official responsibility reaches back prior to the war when Congress created a Council of National Defense, August 29, 1916. An active, virile organization that would insure ample protection to the country in time of peace and full preparation if our country became involved in war was needed. Over six months elapsed, while "Rome was burning," before the council was finally organized on March 3, 1917, with Secretary of War Baker as chairman. Gen. Squier, then Chief Signal Officer, was in control of aircraft matters. Nothing has been done in aviation-nothing was likely to be done. He pooled everything on the Liberty motor when he did start, after the war was on, and put all the Nation's aviation program eggs in one basket.

(To be continued)



## TESTS OF MARTIN TORPEDOPLANE

PENING a wonderful new field of naval warfare, the official tests of the Glenn L. Martin torpedoplane were made on February 11th at the fiying field of the Glenn L. Martin Company at Cleveland, Ohio. The big plane shattered a number of records for speed and climb under heavy load and exceeded not only the contract specifications for performance but even the most sanguine expectations of its builders.

With three men, two machine guns and ammunition, four hours of fuel and a big torpedo weighing 1,650 pounds, a hours of fuel and a big torpedo weighing 1,050 pounds, a total weight of 10,300 pounds, the huge machine left the ground in 14 seconds. With a ten-minute climb on the programme in the course of which the specifications demanded that he reach an altitude of 4,000 feet, Springer nosed the plane toward the sky and had reached his 4,000-foot mark in exactly six minutes according to the official time. In ten minutes the plane reached 5,800 feet, almost a 150 per cent performance. performance.

His climb over, Springer brought the plane down to an altitrible of 1,000 feet for two speed trials over a measured course of one mile. The contract in this case called for a high speed of 105 miles per hour, but the average speed shown on the two trips was 112.25 miles per hour. It is expected that when the proper allowances are made for the altitude, etc., that this mark will be brought up to 114 miles per hour, a most noteworthy performance.

The performances were made before a trial board of Naval officers who had journeyed to Cleveland for the tests. Commander N. B. Chase, U. S. N., and Lieut. E. B. Koger, U. S. N., rode with Springer on the test as observers, while Lieut. J. P. Fitzpatrick and Ensign G. H. McCarthy took note of the performance from the ground. All were apparently very much pleased with the results of the test, and it was announced that the clane will be flown by Springer to McCarth Field. that the plane will be flown by Springer to McCook Field, Dayton, when the army officials will have a chance to see it perform, after which Commander Chase will probably fly it to Bolling Field, Washington, D. C.

The big plane is in practically every respect a duplicate of

Crew of Glenn L. Martin Torpedoplane on its test flight. Left to right: Lieut. E. B. Koger, N. S. N.; Commander N. B. Chase, U. S. N.; and Eric Springer, pilot for the Martin Co.

the well known Martin Bomber, the chief difference being found in the landing gear, which has been split to allow the carrying and launching of a full sized navy torpedo weighing 1,650 pounds. Otherwise there is no essential difference beyond the improvements in detail which might be expected from a progressive aeroplane factory. The plane has a span of 71 feet 5 inches, a height of 14 feet, and is 46 feet from nose to tail. It has no stagger, no sweepback and no dihedral.

This big plane is unquestionably one of the most versatile This big plane is unquestionably one of the most versatile ships ever produced in this country or any other. It has equipment for taking care of every type and size of aerial bomb from the smallest to the 1,650-pound regulation navy torpedo. It has large fuel capacity and machine gun armament, so that it may be used without bomb load for reconnaissance work and if necessary for combat flying at sea. The two 400-horsepower Liberty motors furnish ample power, and either one will fly the plane with full load. In addition the twin-motored feature adds to the ease with which the plane may be maneuvered. It has been demonstrated, for instance, that the plane can be safely landed with rudder controls completely out of commission by steering with the

The use for which this plane is primarily designed is that of acting as an aerial torpedo boat in naval warfare. It can take off from the deck of a sea sled or mother ship and cruise around until its victim is sighted. Then dropping at a speed of over two miles a minute it can get so close to the victim before launching its torpedo that a miss is almost impossible, while its great speed and comparatively small size make it an extremely difficult target to hit. Should, however, the plane be hit and destroyed, the loss of life and property is almost negligible as compared with that resulting from the loss of a torpedoboat destroyer.

The Glenn L Martin Company has an order for torpedo.

The Glenn L. Martin Company has an order for ten of these planes, and has now completed two. The remaining eight should be completed during the spring and will give the U. S. Navy an aerial equipment without an equal.



Photo showing the mounting of the torpedo which weighs 1650



## San Francisco Aero Show

The first national aeronautic exposition to be held on the Pacific Coast will be at the Exposition Auditorium, San Francisco, April 21st to 28th, inclusive. It is one of three national expositions of commercial aircraft to be held in the United States. The aircraft and accessories shown in Chicago in January and in New York in March will be supplemented by other craft which could not be assembled in time for those shows. Exhibits at the New York show will be shipped to San Francisco. Show headquarters until March 20th will be at suite 1905, 501 Fifth Avenue, New York. After that date they will be at the Hotel St. Francis, San Francisco.

## Rolfe-Epps Flying Co. Report Aviation Progress

The areoplane passenger-carrying station and aviation school, established at Athens, Georgia, by the Rolfe-Epps Flying Co., is proving very successful.

L. Montague Rolfe, manager of the company recently flew from Athens, Ga., to Goldboro, Me., and return, a distance of nearly a thousand miles. It is interesting to note his report that the longest distance flown on the trip without seeing other aeroplanes was 109 miles.

He reports that in South Carolina he found aeroplanes operated by local companies in nearly every town he stopped at, and that great interest and activity in aviation is being carried on in the South.

## New Texas Field

Carroll G. Taylor, secretary of the Inter-State Airplane Company of Dallas, Texas, announces the recent opening of their flying field at Paducah,

This field has the official government markings of a Class II field and will be available for all aviators flying in the

The Inter-State Airplane Company is also operating fields at Dallas, Fort Worth, Wichita Falls and other points in the Southwest. They plan to inaugurate a schedule passenger air line from Shreve-port to Wichita Falls this spring.

## Blimp for Aerial Transportation

The Goodyear Tire & Rubber Company has sold to the Commercial Airship Syndicate of Kansas City, Mo., the first lighter-than-air craft the company has ever built solely for commercial purposes.

The ship is the "Pony Blimp" type of airship—the latest development in dirigibles and probably the smallest practicable airship ever constructed. It was designed and developed by Goodyear engineers, had its first trials in December and was exhibited for the first time at the Chicago Aero Show, where Charles Ora, manager of the western concern, first saw it and became enthu-siastic as to its possibilities.

The new company is interested in

aerial transportation for commercial purposes and expects to begin activities by April 1.

## Air Travel at 5 Cents a Mile

Transcontinentl travel by air at five cents a mile is being arranged by the Commercial Aircraft Syndicate, a sub-sidiary of the Goodyear Tire and Rubber Company, it was announced by Charles Ora, head of the syndicate. The Goodyear company has completed plans for the construction of thirty-five ships, five of which will be capable of carrying 200 passengers from coast to coast.

There will be several smaller middle Western lines operated by the syndicate. The first routes will include as stopping points Kansas City, Denver, Tulsa, Oklahoma City, Fort Worth, New Orleans, Jackson, Memphis and Springfield, Ill. The ships that make those stops will have a carrying capacity of from six to fifty passengers.

Mr. Mr. Ora said the first of the small dirigibles to be constructed for the syndicate will arrive for the aeronautical exposition. It will be flown to Kansas City after the show and there put into com-

## Aeroplane to Carry Sixty

Rotterdam.-H. Fokker, the designer of the famous Fokker aeroplane, has drafted the plans of, and will shortly begin building, a large aeroplane capable of carrying sixty persons.

The machine will have a speed of seventy-five miles an hour and will be driven by six motors. It will be provided with sleeping berths and smoking room.

## Organize Plane Co.

The Southern Aeroplane Co. has been organized at Fairmont, W. Va., to carry

on sales and passenger transportation in West Virginia, Kentucky, Tennessee, Mississippi, Alabama and Louisiana. The company expects its first planes to be delivered and will use them in Louisiana and Alabama operating special taxi lines, carrying on aerial advertising, aerial photography, etc. The personnel is composed chiefly of ex-A. E. F. men, with Harrison B. Tucker, president; G. H. Barger, secretary; John J. Niles, vice-president, and H. R. Hall, treasurer.

# To Increase Output of Lawson Aeroplanes

Milwaukee.-Plans are being made for the expansion of the Lawson Airline Co. Milwaukee plant early this spring which, when completed, will include the Lawson company among the largest aeroplane concerns in this country.

Production of ten machines to be completed this spring has begun. Due to the large size of the Lawson machine plant, it is the belief of Lee Wallace, chief engineer, that the production figures are conservative enough to secure the best results in workmanship and design.

## Turner Sales Co. Wins Service Co. Aeroplane

Cleveland.—The Turner Truck Sales Co., distributer of motor service trucks here, has won the aeroplane offered as prize in the recent sales contest conducted by the Service Motor Truck Co. of Wabash. This company operates a fleet of ten aeroplanes to deliver emergency

repair parts.

The aviation department will be trans-Worth, Texas, to Wabash, very soon, and immediately on opening the field some members of the Turner organization will be taught flying so that the prize can be flown home.



Miss Laura Bromwell about to start on an aerial advertising trip over New York City in a Curtiss Oriole

Albert S. Burleson, Postmaster General
Otto Praeger, Second Assistant Postmaster General
Leon B. Lent, Assistant to the Second Assistant Postmaster General
in Charge of Aeronautics
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying John A. Jordan, Chief of Construction George L. Conner, Chief Clerk, Aerial Mail Service John A. Willoughby, Operator in Charge Radio Experiments Eugene Sibley, Operator in Charge Radio Maintenance and Operation



PILOTS

Max Miller
E. Hamilton Lee
Harold T. Lewis
James H. Knight
Walter H. Stevens
Merrill K. Riddick
Robert H. Ellis
Randolph G. Page
Paul S. Oakes
Herbert M. Crader

Charles I, Stanton, Superintendent New York-Washington Division George O. Noville, Superintendent New York-Cleveland Division Edward McGrath, Superintendent Cleveland-Chicago Division William J. McCandless, Superintendent Chicago-Omaha Division Harry L. Hartung, Manager, Heller Field, Newark Herbert Blakeslee, Manager, Bustleton Eugene W. Majors, Manager, College Park Andrew R. Dunphy, Manager, Chicago Maurice J. Kelly, Manager, Bellefonte Victor W. Fitch, Manager, Newark Warehouse

Samuel C. Eaton Frederick A. Robinson Elmer G. Leonhardt Walter J. Smith Paul W. Smith Farr Nutter Wesley L. Smith Joseph P. Harris Clayton W. Stoner Mark C. Hogue

## Mail Aeroplane Makes New Record

A new record in carrying mail by aeroplane was made recently on the trip from Bellefonte, Pa., to Newark, N. J., with 20,000 letters from Chicago for the East. Walter H. Stevens, driving a De Haviland 4, drove from Bellefonte to Newark in eighty-two minutes, clipping one minute off the record.

# New York-San Francisco Air Mail Plan Approved

Washington.—In completing consideration of the annual postoffice appropria-tion bill, the Senate postoffice sub-com-mittee inserted an amendment providing for the establishment of a transcontinental aeroplane mail route from New York to San Francisco, via Chicago and Omaha.

The sub-committee decided to sustain the House action in eliminating appropriations for the present Washington-New York aeroplane mail route and for establishing new ones between Washington and Atlanta and Pittsburgh and Omaha.

## Chicago-Cuba Aerial Mail

In the Middle West and South-East a strong campaign is being carried on by newspapers to persuade Congress of the value of a new link in the aerial mail service linking up St. Paul with Tampa, Key West and Havana. The proposed route would touch St. Paul, Minneapolis, Mil-waukee, Chicago, Danville, Terre Haute, Evansville, Nashville, Chattanooga, At-lanta, Macon, Jacksonville, Tampa, Key West, and Havana. It is pointed out that mail could be sent from Chicago to Cuba and received in less than a day, where it now takes three days.

The time table, rail and air, shows that the airship will cut the time to one-third.

		Ho	1115
3.031	G		
Mile	s Stations	Air	Ka1
286	Chicago to Evansville	31/2	9
157	Evansville to Nashville	2	5
288	Nashville to Atlanta	3	10
	Atlanta to Jacksonville		13
	Jacksonville to Key West		18
	Key West to Havana		3
E	apsed time: Rail, 58 hours		
Ai	r, 20 hours.		

## India Inaugurates Aerial Mail

The aerial mail has been successfully inaugurated. De Haviland machines left Karachi, stopped at Rajkote and arrived in time to make the outward mail at

The actual time of transit is 6 hours, as against 36 by steamer, and if seaplanes are available the transit can be done in 5 hours.

## Form Aerial Photographers' Association

About 400 men who were in the Photo Branch of the Air Service, U. S. Army have formed a national society called U. S. Army Aerial Photographers' Association whose objects are to perpetuate the good-fellowship and friendships that the service has generated and to prevent their being broken up by the re-entrance of the members into civil life, and to promote interest in aerial photography as a profession, art and science and to publish a periodical to further the above mentioned

objects.

The Association is now permanently established and a convention is planned for Sept. 4, 5, and 6, 1920, at Rochester, N. Y.
Membership drives are now being in-

stituted in all parts of the country.

## To Land First Aviator in Alaska

Seattle, Wash.—Seattle will land the first aviator in Alaska. Teel Williams, president of the Aero Club of the Northwest, has given assurance that this city will have the honor of sending the first aviator to visit the cities of the Northern territory in the big Boeing seaplane, which is capable of making the trip to Juneau in one day. The air mail service for the far one day. The air mail service for the far North will leave from this city when the Post Office Department establishes aerial service to a number of Alaskan towns on the seacoast.

## Demonstrate Aeroplane with Skis

Springfield, Mass.—The first aeroplane equipped with skis instead of wheels to appear in New England and practically the first to be used in this country, ar-rived in Springfield recently, when W. F. Long and Thomas H. Potter, driving an Arvo plane, landed at the end of first leg of their journey from Mineola, L. I., to Boston.

The skis, which are ten inches wide and four feet long can be interchanged with wheels in 15 minutes. The idea of using skis opens up a wholly undeveloped field

for aviation, as winter flying, which is possible when ski-equipped, has heretofore been but little attempted.

Another feature of the machine is a safely curved skid, which projects one and one-half feet in front of the propellor, and absolutely prevents the ma-chine from standing on its nose at any

## Personal Pars

Walter D. Bonner, formerly ensign in the United States Navy, left San Fran-cisco to take charge of the Ricou Aerial Lines in China, as general operating superintendent. During 1918 Bonner, flying a Curtiss R-6 seaplane, covered 90,000 miles of ocean, scouting for submarines. He will now be in charge of a number of aeroplanes, seaplanes, pilots and mechanics operating commercial air lines in the Orient. Bonner will work with Capt. C. E. W. operating commercial air lines

Ricou, the French flyer and merchant, who recently had shipped for his work in China a \$500,000 consignment of American seaplanes, including seven Curtiss HS2Ls and H-16s. Bonner has been flying since 1911.

Ralph Johnston, who holds the world loop-the-loop record, made while in the army aviation service at Carlstrom Field last year; George Haldman and Roger Q. Williams, have formed a partnership with some feature men for a flying circus, and plan to tour the country next summer. At present they are giving exhibition flights.

Bob Gordon, who was with the Shaw Flyers at Parkersburg, W. Va., has ar-rived in the city to begin preparations for the organization of a flying circus, which will be backed by several Parkersburgers and have its headquarters there. Two three-passenger planes have been secured and Billy Coates and another pilot will be in charge. Feature acts will also be se-cured, among them a triple parachute jumper.



# NAVAL and MILITARY \* AERONAUTICS \*



## Balloon Flights Daily at Army School

At the United States Army Balloon School, Fort Omaha, Nebraska, two captive balloons are being flown every morning from 8:30 A. M. to 11:30 A. M. One of these is used primarily as a training balloon, for both ground and air work, and maneuvering, etc. The other balloon is used primarily for experimental work and on it are tried out all of the experiments that have progressed sufficiently to be ready for field tests.

A free balloon flight is now made from

this post every Sunday.

## First Pursuit Group Active

The 1st Pursuit Group, located at San Antonio, Texas, received several additional pilots recently, namely Lieut. Riddlesbarger, who will be assigned to duty as Assistant Provost Marshall in San Antonio; Lieut. Roeder, who has just been relieved from duty in the forest patrol, and Captain Stenseth, who is one of the few "Aces" that has remained in the Service. This group consists of the 27th, 94th, 95th and 147th Aero Squadrons.

A monster formation composed of all available pilots of the 1st Pursuit Group flew about the vicinity of San Antonio. A flight from the 27th Aero Squadron, known as the Blue Forces, was sent out attack another formation from the 147th Aero Squadron, known as the Red Forces, the idea being to train the pilots under actual battle front conditions and to enable them to become acquainted with meteorological conditions. The purpose of these patrols is to teach not only the Flight Commander, but each pilot engaged with him, the advantage of attacking from the blind angle of the enemy's Camera guns are used in these patrols for recording the mistakes made by the pilots. After the films are developed such mistakes will be taken up in the school of the squadron and discussed.

## Demonstrate Rapidity of Aerial Photography

During the military carnival held for the benefit of General Pershing at the headquarters of the 104th Aero Squadron, El Paso, Texas, the First Photo Detachment attached to the First Surveillance Group, demonstrated the rapidity of the Air Service aerial photography. A photographic plane equipped with the latest graphic plane equipped with the latest photographic applications, piloted by Lieut. T. P. Smith of the 104th and with Sgt. McConnel (photo section) as photographer flew over the reviewing stand and grounds where the manoeuvers were being held. A picture of the carnival was taken, the ship flew back to the Airdrome, and the plates sent to the photographic and the plates sent to the photographic developing room, developed and printed, the finished picture placed in a message bag and put aboard the same plane and flown back and dropped at the reviewing stand fifteen minutes after being taken. This record was broken by the Photo Detachment when a plane piloted by Lieut. Harvey of the 104th, Sgt. McConnel, photographer, took a picture of the reviewing stand while General Pershing was present and nine minutes later dropped the finished picture at the re-viewing stand.

# Activities of Aviation School Progress at March Field

Aerial activities are on the increase at March Field. With from five to twenty aeroplanes in the air and the various departments in full running order, it recalls the days before the armistice was signed. A regular scheduled course is being carried out with every man on the post given an opportunity to improve his education along many lines. To the recruit just arriving this service will be doubly valuable, making him a trained man within the army and giving him a trade which will serve well in civilian

The arrival of Lieut.-Col. F. Bradley, of the Field Artillery, may mean that an additional course will be added to the school for aerial observers. Colonel Bradley will make a report to Washington as to the practicability of establishing such a course at this field, which will between aeroplanes and field artillery.

Preparations are also under way to standardize the cadet course so as to care

for another class of from 100 to 150 who, under present plans of Air Service authorities, will arrive in May.

## Navy Men to Help Build Dirigible

Washington.-The assignment by the Navy Department of two naval aviation officers to London in connection with the construction of the rigid airship for the United States government by the British Admiralty is the first active step taken by Secretary of the Navy Daniels preliminary to another trans-Atlantic flight by American naval officers.

The two officers, Commander Louis H. Maxfield and Lieutenant Ralph G. Pennoyer, are the vanguard of a large company of American naval aviators who will actively assist in the construction of the huge craft, which requires a crew of eighteen men to operate. They will spend some months in learning how to operate airships of similar construction in to be prepared to bring the big airship to this country in the spring of 1921.

The airship, similar in type to the British dirigible which successfully made the flight to this country last year, is to be the largest flying craft ever constructed. An immense hangar, now being built at Lakehurst, N. J., is to house the monster of the air when it arrives in this country.

## Navy Enlisted Men On Flying Duty

Rear Admiral Samuel McGowan, S. C., U. S. N., announces the following decision received from the Secretary of the Navy as to the date of commencement of increased pay for enlisted men detailed to duty involving flying: "Enlisted men of duty involving flying: "Enlisted men of the Navy who are detailed to duty involving flying by orders of their commanding officer are entitled to the increased pay from date of entry upon such duty, regardless of the date of approval by the Bureau of Navigation. The decision of the Comptroller of the Treasury, dated August 4, 1919 (S. & A. Memo, 4892), applies to an appointment as student aviator and has no application whatever to the question of enlisted men detailed to duty involving flying by their commanding officers.



General Pershing examining a gold key to the Goldwyn Studios which was dropped to him by parachute from an aeroplane



## **FOREIGN** NEWS



Aeroplanes For Freight Service

## Latest List of Italian Aces

Latest List of Italian Aces

The following is the official list of the Italian aces, with number of planes downed. A † indicates the aviator is dead. Last name appears before given name: Major †Baracca, Francesco, 34; Lieut. Scaroni, Silvio, 26; Lieut. Col. Piccio, Pier Ruggero, 24; Lieut. Baracchini, Flavio, 21; Capt. Ruffo di Calabria, Fulco, 20; Lieut. Ranza, Ferruccio, 17; Sergt. Cerutti, Marziale, 17; Lieut. †Olivari, Luigi, 12; Lieut. Ancillotto, Giovanni, 11; Sergt. Reali, Antonio, 11; Lieuts. Novelli, Castono, 8; Avet, Flamino, 8; Lombardi, Carlo, 8; Leonardi, Alvaro, 8; Cabruna, Ernesto, 8; Sergt. †Nicelli, Giovanni, 8; Capt. Riva, Antonio, 7; Lieut. Fucini, Mario, 7; Lieut. Elenteri, Leopoldo, 7; Sergt. Mag. Fornagiari, Guglielmo, 7; Sergt. Renello, Cosimo, 7; Capt. Constantini, Bortolo, 6; Lieut. †Olivi Luigi, 6; Lieut. Parvis, Giuliano, 6; Sergts †Imoleso, Attilio, 6; Stoppani, Mario, 6; Nardini, Guido, 6; Secchese, Aldo, 6; Ticconi, Romolo, 6; Magistrini, Cesare, 6; Rizzotto, Cosimo, 6; Capt. Lega, Giulio, 5; Lieuts. †Sabelli, Giovanni, 5; Buzio, Alessandro, 5; Sergt. Chiri, Antonio. Besides there were 200 -military aviators who have shot down from four to one enemy machine. There are not included in these lists the aces of the Royal Italian Navy, who have shot down more than fifty enemy air machines.

## Swedish Aerial Route Planned.

The Swedish Air Traffic Co. will in two months start their first aerial route from Stockholm to Sundsvall, where sheds have been erected.

## D'Annunzio Unable to Make Tokio Flight.

Rome.—Gabriele d'Annunzio has sent a dispatch from Fiume saying that he will be unable to participate in the proposed flight from Rome to Tokio.

He will be represented by Captain Martinetti, who will arrive in Rome from Fiume shortly and who will command a squadron of five planes.

## Contest For French Pilots

The Entertainments Committee of Paris is arranging a contest exclusively for French pilots in May next. There will be three classes of machines—the first two for single-seaters and two-seaters with a minimum speed of 120 kilometres; the other class for multi-seaters with one or two engines and the same minimum speed, to carry a useful load of 300 kg, with an allowance of 100 kg, for every extra passenger after the first three, and fuel for three hours. Each machine must make a tour of the course and land within a circle of 100 metres diameter for machines of the first and second classes, and 150 metres diameter for machines of the third class. All the machines must be of French construction. French construction.

## Frail Goods Shipped By Aeroplane

Amongst the goods recently carried between London and Paris by Handley Page aeroplanes, have been consignments of satin, scents, jew-ellery and sample boxes of apples. The growing confidence in commercial flying is indicated by the fact that a London firm recently sent a number of valuable antique vases by air to Paris to assure that they would not be damaged by the rough handling to which they would be subjected if carried by steamer or rail.

## The Michelin Prize

The Michelin Prize

M. André Michelin has offered a prize of a million francs to the aviator who makes a flight under certain conditions. The French journal, L'Auto, gives the details of these conditions. The winner of the prize must have flown from a point somewhere in a radius of ten kilometres from Versailles, must have made a turn round Rheims Cathedral, and reached his point of departure in less than 1 hr. 15 min.—that is to say, having flown at a speed of 200 km. per hour. Then, without landing, he must fly at a height of not more than 100 metres from the ground, tracing out an equilateral triangle with sides 3 km. 600, and turning inside the angles of the triangle. This feat must be performed within one hour. The landing must be effected in the ordinary position of flight and without serious damage to the machine, which must not be run on for more than five metres after the time when one of the parts has touched the ground. The conditions are hard, but M. Michelin hopes by this means to stimulate interest in aviation.

## British Air Base at Bagdad

Great Britain relies largely upon her air forces for the defense of Persia and Mesopotamia, according to official advices received here. Winston Churchill, British War Minister, recently informed Parliament that air bases have been established at Bagdad and Karachi, the latter a port on the Arabian Sea.

Military experts here attach great importance to this announcement, as it is the first time, authorities say, that air forces have been relied upon to so large a degree purely for defense.

British authorities have feared that Bolshevik troops might enter Afghanistan and attack Persia from the flank. It is believed the aerial forces have been organized partly to meet this threatened danger.

## Aerial Traffic Convention Signed by British, French and Swiss

Berne.—Switzerland signed a provisional convention with France and Great Britain dealing with aerial traffic, which comes into force March 1.

Each country agrees to grant free passage over its territories and territorial waters during peacetime to registered aircraft which comply with the conditions of the convention.

Air machines must not carry wireless without special licenses from their States, according to the agreement, and must cross frontiers only at certain points which are to be specified. Each of the States will name one or more aerodromes on its territory which must be used for the arrival and departure of machines.

Rome to Rio de Janeiro

An attempt is shortly to be made by Italy to cross the Atlantic from Rome to Rio de Janeiro in a new commercial semirigid airship designed by Signor Celestino Usuelli. This airship, the T 34, which is nearing completion in the huge airship shed of Ciampino, has a capacity of 36,000 cubic meters, a length of 140 meters, a height of 30 meters, and a diameter of 22 meters. The keel of the T 34 differs from those of the Zeppelin and English rigid airships, being a triangular framework running from one end of the ship to the other. The keel itself is strengthened by a supplementary framework of special steel tubing and aluminum which gives to the ship a solid cigar-shaped form. There are no gondolas, the various cabins, engine rooms, and navigators' cabin, being enclosed in the keel.

Aerodrome for Bombay

The Government of Bombay is acquiring about 800 acres of land in the Thana district near Bombay for the purpose of erecting an aerodrome and auxiliary installations.

Farmans in Columbia

Monsieurs Jourdanet and Bazin, the well-known French pilots, have gone to Columbia, accompanied by several mechanicians to start a new aerial line in that country. The Columbian company, known as the Compania Columbiana de Navegacion Aerea de Medelin, is capitalized for four million francs. According to Mr. W. Wallace Kellett, American representative of H. & M. Farman Co., they have already purchased a Goliath and several smaller Farman planes which are now en route to Columbia. The Goliath will be used to start aerial transportation service between Baranquilla and Medellin, a distance of about 700 kilos. Medellin is the second city of Columbia in size and the mining and industrial center of the country. At present there are practically no roads between the two cities.

## Swedish Aerial Traffic

The Swedish Air Traffic Company has applied to the Government for a loan of kr. 2,000,000, at the lowest possible interest, to be used for the purpose of establishing regular communication by air between Sweden and the Continent.

## London-to-Madrid by Air

Madrid.—Spanish government authorities are planning to inaugurate a London-to-Madrid passenger service by aeroplane within a few months.

## Girl, 14, to be Aviator in France

Paris.—The number of women aviators in France, which for some time has stood at thirteen, is soon to be increased by one who will establish a record for youthfulness, being only fourteen and a half years old. She is Andrée Farman, a daughter of Maurice Farman, a brother of Henry Farman, one of the pioneers in aviation. Miss Farman flew for the first time in 1909.

## The French Mission In the Argentine

Between November 4th, 1919, and February 7th last the French military aeronautical mission in the Argentine has made 650 flights between Buenos Ayres and Mar del Plata, covering a total of 48,467 miles. In this time 1,745 passengers were carried.

## The Paris-Melbourne Flight

M. Poulet embarked on the mail boat "Buenos Aires" at Marseilles on February 5th. He is returning to Rangoon via Singapore to complete his flight to Australia on the new machine.

## Organize Aerial Arm of Japanese Army

Organize Aerial Arm of Japanese Army

The aerial arm of the Japanese army is to be composed of four aviation battalions, each of three squadrons. An aero-station company with French instructors has already been formed.

Considerable attention is being paid to naval aviation, and a naval centre for this purpose is in existence at Orama, near Yokusuoka. At this place personnel is trained in piloting, bombing, etc. A second school is to be opened near Karokara.

It is understood that the Japanese Government have allocated \$350,000,000 for the purchase of aviation material in 1920, and General Nagaoka is in Europe buying aeroplanes and all that appertains to them. It is worthy of notice that civil aviation is controlled by the Ministry of War.

## From Holland to Java

Lieut. F. J. Backer and Flight Lieut. P. M. van Wulften-Palthe, with two mechanics, will fly a Vickers flying-boat from Holland to Java. The two officers have recently returned from a visit to England, the visit having for its object the inspection of the flying-boat.

## New Aerial Service on Mediterranean Sea

An aerial service is to be opened between Marseilles and Tunis under the administration of the Compagnie Maritime Aerienne. The French end of the line will be provisionally at Antibes, and intermediate alight-ings will be made at Ajaccio, Córsica, and Cagliari, Sardinia. The service will be maintained by hydro-aeroplanes.

New Swiss Aerodrome Near Basle

An aviation ground is in existence at Sternenfeld, near Birsfelden.

It may be possible to use this as a station for hydro-aeroplanes based on the Rhine.



# ELEMENTARY AERONAUTICS

# MODEL NOTES

By John F. McMahon



## Covering and Proofing of Model Planes

Turning now to the question of covering, we can consider the material best suited to this purpose, and the methods of attaching and proofing the fabric. Excluding the commercial fabric specially made for model aeroplanes, there are only three materials that can be purchased from the drapers worthy of notice—Jap silk, Nainsook, and Irish line. The former is by far the most suitable, weighing only 1¾ oz. to the square yard, the two latter nearly double this. Again, Nainsook and Irish linen absorb twice the quantity of dope required for Jap silk, which makes their ultimate weight prohibitive for small models. Apart from this, the silk can be obtained in a greater variety of shades, and individual tastes can thus be better suited.

However, it is not so much upon the actual material that we need dwell as upon the doping and covering of the plane; a bally covered or proofed wing can interfere materially with the flying of the model. Yellow silk should be used for preference, as this color is least affected by the action of the dope.

Now, as to the actual covering. Fig. 36 shows an ordinary wire elevator, the dotted lines indicating the shape to which the fabric is cut. The correct procedure for covering (provided the fabric is to be secured with glue) is to fasten one end of the wire frame to the table, with the fabric between, by means of two drawing pins, one at each corner. Now stretch the fabric and similarly secure the other end of the frame over it. V pieces should be cut out of the edges where the lap would encounter the ribs. Glue the lap, using a clean tube-glue, allow to get tacky, and then press it over with a linen wad, at the same time effacing any wrinkles by suitably pulling the seam.

The method of covering a wooden wing (Fig. 37) is to cut the fabric to the shape shown by the dotted lines. Now glue the end ribs of the plane on the *undernath* side. Press the end laps over the ends, pulling the fabric sufficiently taut to give the wing a curved dihedral, as at A. When the ends are dry proceed to glue the laps underneath the spars, working the fabric taut while pressing it down to the wood.

It is preferable to bend the wing spars to the correct dihedral (see B), as, by imparting a dihedral afterwards by means of a cross-bracing, the fabric is thus slackened, so that the fabric, when the machine is in flight, instead of remaining true to the form of the plane, balloons out. It will be found advantageous in cross-bracing the wing to continue the thread down through the end rib and thence up through the second hole, as in Fig. 38. It will then be found possible to warp the wing when necessary. The bracing should be affixed in two pieces, so that the plane can be left flat when not in use. A hook of the shape shown in the upper sketch of Fig. 38 will be required to connect up the bracing threads.

Fig. 39 illustrates the method of double surfacing a wing. As before, the fabric is stretched end to end first, and allowed to set. The V seams are then glued home, and the fabric pulled over the top surface, being finally finished as in Fig 40. It would be necessary in double surfacing to give the fabric a coat of dope first to prevent the varnish percolating through the pores of the fabric and coagulating inside the wing.

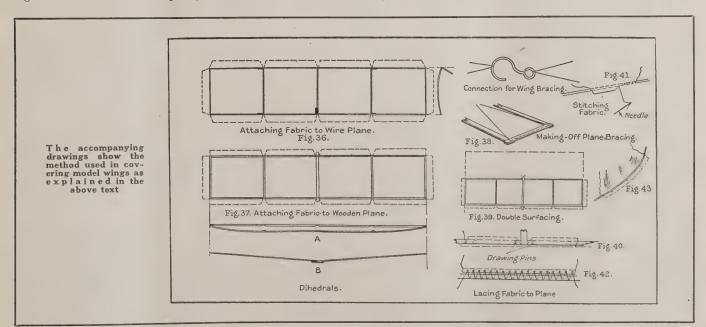
With wire wings it is better to sew the fabric to the frame. Just pin the fabric round the frame, stretching it sufficiently to avoid distortion of the wing, and then sew round with an over-and-over stitch, as in Fig. 41. The overlap should be trimmed off to within  $\frac{1}{16}$  of an inch of the stitching and then lightly glued round to prevent the edges fraying.

Another method is to cut the fabric 1/16 smaller than the wing, machining a hem along to form a substantial bearing for the ½ eyelets which are fixed in it. Through these pass the silk lacing cords which fasten the fabric to the wing spars in the manner shown in Fig. 42. Although this is hardly a neat method of fabric attachment, this later is easily detachable to allow of repairs to the wing framework; moreover, it permits of the fabric being tautened when it has become saggy.

When gluing the fabric to wooden spars, drawing pins may be partially pressed into these latter to hold the fabric until the glue it set. Fig. 43 shows how fabric should be notched to turn over on to a curved edge.

A good proofing can be made by diluting varnish with linseed oil in the ratio of 3:1. It does not go hard, neither is it hygroscopic, and two thin coats should be sufficient to make the fabric impervious both to air and water.

Varnish reduced in "body" with turps can also be recommended. In no instance should petrol be used to dilute varnish, the result of so doing being a varnish that, when dry, cracks upon the slightest touch.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

## Gabriel Correspondence School

LESSON NO. 2

Having picked the victim for your first flight, approach stealthily from the rear. Never frighten an aeroplane. Stroke it, murmuring gently, "Vol! Plane; Vol! Plane." This corresponds to the farmer's "So, bossy," or "Whoa, mule."

Notice the general appearance of the machine at close

range. The double decked open air sleeping porches on each side are wings; in the nose of the thing is the engine. It may be laid down as axiomatic that without an engine and wings you won't go any further than a 15c can of beans in a hungry regiment, so be sure you have an engine and wings.

Approach the cockpit, not a rooster's bull-ring, place one hand lightly on the edge and leap gracefully into your seat. You may find the assortment of wires, dials, levers, belts, etc., somewhat bewildering and confusing; however, once you get in the air you will find which ones are the important

The short cane imbedded in the floor between your knees is the joy-stick. The joy-stick is the heart and soul of the "ship." (Use the word "ship" freely when you mean aero-plane; it shows you are a flyer; never say flying machine.)

There are several dials on the instrument board, but as it might be confusing to explain these to the beginner, it will be best when you first get into the air to be sure they all point somewhere other than zero.

One of these dials indicates altitude. In connection with the first lesson, we suggest trying to determine which one it is. When in the air it will be advisable not to fly far on your back if this indicates 100 feet or below. It is best not to trust this fickle instrument below the height of a telegraph pole, especially while looping. (The expression looping the loop is obsolete.)

A lever near your shoulder is your spark, and when the mechanic starts to wind up the engine you push one way as he says "Off" and yell back, "Off." Then when he quits work and says "Contact," you say "Contact" and push the other way. Always push the lever the opposite way from where it then is to the place where it then isn't. This saves figuring whether contact means "On" or "Disengaged."

The other lever is the gas (or gun), and by manipulation of these two levers, hope, prayer and swear, you may be able to keep the engine going. We hope to get you in the air next month.

## Society Note

At the next aviators' ball Mademoiselle Cabanne will introduce the Wing Skid, Side Slip and Diagonal Strut.

## Plane Maxims

Look before you land. A plane is not sold when it flitters. It's a wise pilot that knows his own plane. If aeroplanes were horses, Pegasus wouldn't be a myth. low plane should have no turning. Necessity is the mother of a landing field. Land in haste, repent in barracks. One good loop deserves another.

He—We're coming to a tunnel. Are you afraid? She—Not if you take that cigar out of your mouth!— Awawan.

## Advance News

Air battles to decide the next war.-Newspaper headline. And not hot air battles, either.

## Must Have Been an Aviator

"May I print a kiss upon your lips?" She nodded her sweet permission; So they went to press and I rather guess They printed a whole edition.

Dropping in unexpectedly on our Mexican neighbors appears to be a favorite army aviation stunt.



Will it come to this?

Courtesy "Joy Stick."

## **Definitions**

Wings: The family support.

Stick: A double-jointed slippery cantankerous thing in the cockpit.

Center Section: As in a theater, directly between the wings.

Banking: Beware of slipping into pockets when in this banking business.

Three Point Landings:

- 1. First Solo Whole, Hearty and Нарру.
- 2. First Scout Rough, Tough or Bluff.
- 3. Pursuit Pilot-Seldom Seen Since.
- 4. Loop: A swing around the circle.

## A United States Naval Officer Says;

The engines on the C-5 are the most economical built. They have recently undergone some wonderful tests in Washington, and it was found that this typemotor is almost impossible to weet out."

The C-5 holds the world's and far non-rigid straking to a monestop long distance the ha

UNION GAS ENGINE CO.



## U. S.ARMY AIR SERVICE LABORATORIES



The engine testing laboratories in the U.S. Army Air Service Engineering Department at Mc Cook Field, Dayton, are the finest in the world.

The laboratory is equipped throughout with Sprague Electric Dynamometers.

There are four large units, arranged to be capable of testing the largest engines, and in addition a number of smaller sets and a special propeller testing station and wind tunnel, also equipped with Sprague Dynamometers. meters.

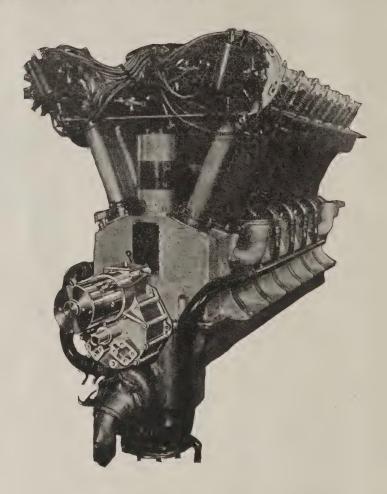
The Sprague Electric Works has brought out a new single-unit Dynamometer with a rating of 600 H.P.

This has been developed for testing very large aviation motors.

Of General Electric Company PIONEERS OF THE INDUSTRY



### Announcement



### LIBERTY

(TRADE MARK)

Hand and Electric STARTER

WILL BE SHOWN IN OPERATION ON A LIBERTY MOTOR  $_{\rm AT\ THE}$ 

### **AERONAUTICAL SHOW**

71st ARMORY :: :: March 6-13, 1920

### LIBERTY STARTERS CORPORATION

620 FIFTH AVENUE NEW YORK

# Important Announcement to Aeronautic Engineers

Developments of tremendous importance in aero engines have occurred during the war period, and realizing that there is not available today an authoritative work of a thoroughly up-to-date character on aero engines, The Frederick A. Stokes Company has arranged with E. H. Sherbondy and G. Douglas Wardrop to prepare a comprehensive volume dealing with the principles and theory of aero engines, and describing completely all of the successful aero engines that have been developed during the war.

The volume will comprise at least 400 pages, of large size, seven inches by ten, permitting a very full discussion of every important phase of the subject and also the presentation of photographs and diagrams of a size to be of value

to the designing engineer and student.

The below partial list of contents gives an idea of the scope of the work:

### Historical and Theoretical Discussion

Definitions of Fundamental Notions of Mechanics and Thermodynamics; The Working of Processes of Internal Combustion Engines; Equation of Condition for Gases; The Behavior of Combustible Gases During Ignition; The Gaseous Mixture; Technical Analysis of the Four Stroke Cycle; The Work Available and Efficiency; Method of Calculating the Power of an Engine; The Power Variables; Characteristic Performance; The Effect of Altitude on Power; Variation of Power with Pressure; Altitude and Power; The Effect of Increasing Compression; Technical Analysis of the Power Required for Flight; The Power and Weight of Aviation Engines; General Theory of the Turbo-Compressor, The Sherbondy Turbo-Compressor for a 400 H.P. Engine; Technical Theory of a Turbo-Compressor; The Strength of Rotary Parts of a Turbo Compressor; Analysis of Stresses in the Blower Impeller; The Effect of Back Pressure in the Manifold; The Effect of Altitude on Fuel Economy With and Without a Compressor.

### Engine Types

American: Aeromarine Type L; Curtiss K-6 and K-12; Curtiss OX; Dusen-

berg 850 H.P.; Hall-Scott L-4; Hall-Scott 6-A; Hispano-Suiza; King 550; King-Bugatti; Lawrence; Liberty; Packard; Sturtevant;

Union 120 H.P.

British: A.B.C.; Beardmore; Cosmos; Napier; Panhard; Rolls-Royce;

Siddeley-Deasy; Sunbeam; Zeitlin.

French: Clerget; Gnome; Le Rhone; Lorraine-Dietrich; Peugeot; Renault

200-400-700; Salmson.

German: Austro-Daimler; Basse-Selne; Benz 160-230; Maybach 300;

Mercedes 180, 240, 260.

Italian: Fiat Airship; Fiat 300; Isotta Fraschini; Lancia, Spa.

The work has been prepared for the purpose of having in one volume the complete information concerning all modern types of aero engines and an up-to-the-minute discussion of the principles of aero engine design and construction, so that the reader may be able to undertake comparative research without recourse to a formidable list of volumes and publications, which in any event could only supply him with more or less obsolete information.

To The Frederick A. Stokes Company, Fourth Avenue, New York.

Please send me as soon as published a copy of the Textbook of Aero Engines, by Sherbondy and Wardrop, for which I enclose my check for ten dollars herewith.

(Signed)....

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- 1. Unexcelled observation. You can see the wheels when 6. Economical to operate. Fuel cost 1 cent per mile of landing.
- 2. Slow landing speed.
- 3. Will start or alight on roadway, etc.; no need for large field.
- 4. Can be stored in small barn, garage, etc., when not in use. No need to erect hangar.
- 5. Ease in getting in and out of seat, particularly desirable for ladies.
- flight.
- 7. Low upkeep cost. Plane can be moved about on ground by one person.
- 8. Motor, reliable and efficient. Easy and simple to operate. 18 years' reputation back of it.
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### The Aerial Performance of the Year



Crew of U. S. S. Martin "Round the Rim Flyer"—left to right, Col. Hartz, Lieuts. L. A. Smith and E. E. Harmon, Sergts. John Harding, Jr., and Jeremiah Tobias



Cleveland to Washington	. 350	miles
(four times)	. 450	miles
Washington to Dayton and return	rn.	
(two times) Washington to Langley Field an	ıd	miles

When the Martin Bomber commanded by Colonel R S. Hartz and piloted by Lieut. E. E. Harmon landed at Bolling Field, Washington, D. C., on November 9th—having successfully completed a trip of 9823 miles around the rim of the United States—it set a new milestone in the aeronautical history of this country.

The Martin "Round the Rim" Bomber set a record for sturdy efficiency that is absolutely unparalleled in the history of aviation. The feat of circumaviating the States wound up a year of consistent, high class performance without equal, during which time this plane flew for a total of 225 hours and 24 minutes, covering a total of practically 20,000 miles.

This particular airplane undoubtedly has more noteworthy cross country performances to its credit than any other airplane in this country. In addition to its recent trip around the United States, in the course of which it set a new American non-stop record of 857 miles in 7 hours and 10 minutes, it has made the noteworthy cross country flights here recorded.

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Our large Curtiss flying boats accommodating six and twelve passengers, now operating from Palm Beach to Havana and points in the Bahamas will come north in April for service from New York to points along the Connecticut and Jersey shores.

> Three passenger Seagulls, Orioles, new and used J. N's, ready for prompt delivery.

### AUTOMATIC LANDING "T" BIG AID TO AIRMEN

CARCELY less essential to successful aviation than a level landing field of ample proportions is a reliable wind indicator of sufficient size to be visible from a great distance for the guidance of aviators landing upon the field or passing over it en route elsewhere. This has been supplied by Lieut. Lawrence E. Cook, A. S. A., in his automatic landing "T."

ing "T."

Heretofore the makeshift wind indicators used by the Army Air Service and by aeroplanes of commerce have failed

because of the indispensable human element connected with them.

Two types of wind indicator, both still in almost universal use in spite of their unreliability, are the "sock" form of pen-nant attached to a pole on top of a build-ing at the edge of the landing field, which as often as not is rendered useless as a result of its habit of wrapping itself about the pole, and two strips of white cloth in the shape of a "T" thrown out upon the field, the direction of the wind being indicated by the position of the "T," which is supposed to point into it. This works satisfactorily so long as the wind does not change, or if it does the "T" is shifted accordingly by human hands. Should the wind veer suddenly from the south to the north and the "T" indicate to the newly arrived pilot that it is still in the south, as would inevitably be the case unless the mechanic were on the job, the landing would be very difficult.

The only absolutely safe way to land is into the wind. With Lieutenant Cook's automatic wind indicator which, like an ordinary weather vane, veers with every result of its habit of wrapping itself about

ordinary weather vane, veers with every

breath of wind, the aviator is never in doubt as to the actual direction of the wind at the surface of the field at the moment of his descent.

moment of his descent.

In addition to indicating the direction of the wind the Cook "T," by large letters upon its slanting sides, informs the aviator as to the identity of the town he is approaching or passing over. This sign, in black letters on a white surface, is legible to the pilot at an altitude of 12,000 feet in the daytime. At night the "T" is illuminated, thus serving simultaneously to identify the field and indicate the direction of the wind for night landing.

The Cook invention is forty feet long, four and one-half feet high and six and one-half feet wide. The nose is pointed and the tail is the shape of the tail of a

and the tail is the shape of the tail of fish. The weight of the indicator, which is constructed in sections to facilitate

handling in moving from one field to another, is 260 pounds.

"This 'T' was made and devised by me in the fall of 1917 and put into use at Rockwell Field, San Diego, Cal.," said Lieutenant Cook at Mitchel Field, Mincola to which recently he has been Mineola, to which recently he has been attached. "There had been quite a numattached. "There had been quite a number of cadets who had difficulty in seeing the 'sox' that told the direction of the wind, for most of the time they were wound around the poles to which they were attached. The 'T' which was put upon the ground was never right. It had to be changed at every shift of the wind and this change was seldom made. After my 'T' was put into use it was a simple matter to see the true direction of the wind at all times."

Lieutenant Cook's automatic landing "will be a great help to pilots land-"I" will be a great help to pilots landing at municipal fields, as the name of the city or town is painted on the "T" and tells the pilot just where he is. The other feature is that at night the true direction of the wind can be seen and also the name of the city or town, as the "T" is illuminated.

He has been studying the lighting for

He has been studying the lighting feature of fields at night and has gone into the subject quite deeply. He has also de-vised an aerial lighthouse for use on air

Lieutenant Cook has gone to his home in San Francisco on a thirty-day leave. From there he will proceed to Panama by way of New Orleans for aeroplane coast patrol duty.

### System of Ground to Aeroplane Signalling.

The following system for signalling 1. The following system for signalling from the ground to an aeroplane was devised and put into use by the first Bombardment Group, El Paso, Texas, and its use has been approved by the Department Air Service Officer, Southern Department. It is now being used by the First Surveillance Group in its Border activities.

activities.

2. Explanation and instruction for the use of the "D-R" system:

(a) From working with ground troops along the Border it has been found that lack of ability to send simple messages from ground to aeroplane limits to a very great extent the value of the plane. For example, a cavalry column wishes to inform plane that a courier has just brought in report that troops C and K of 8th Cavalry at Bosque Ranch have

been attacked during the night, horses stampeded and both troops cut off from water and low on ammunition. Unless plane can land alongside of cavalry col-umn which is very unlikely, there would be no way of transmitting the message to the plane for necessary action, whereas if the ground troops could send one short simple message, the whole situation should be cleared up. It is impracticable to transmit by panels other than pre-arranged sentences or characters and when used by line troops there is a big chance for mistakes.

(b) The only solution for this seems (b) The only solution for this seems to be a simple system of message transmission. Experiments have been made with wig-wag but this falls due to confusion of forward and sideward movements of flag. Semaphore fails due to inability to read different positions accurately. Panneaux and projector not reliable. The DR system was devised and tried out with good results and with and tried out with good results and with practice can be used at rate of about five words per minute. It has the advantages of being clear, simple, easily learned and not effected by direction in which sender

Following is explanation of details of D-R system: International code used.

Flags 2' square, white with red center 8" square, handles about 30" long.

Plane flies at 500' to 100' describing a circle with diameter about 3000', inner wing dropped about 20%.

### From Ground

Dot-Flags sideward horizontal (Character R in Semaphore). Dash-One flag vertical over head, the other straight down

(Position D in semaphore.)

Attention-Same as semaphore (Char-

acter U). Error--Same as semaphore, C. Hopped up and down to right.

### From the Air

Re	eady	to	rece	eive					one	e zoom
						(	shc	ort	steep	climb).
										zooms
Ι	unde	rsta	and						.three	zooms
	(0)	3 X / L			a+:	n 1	1	ah.		about A

(c) When practicable observer should drop copy of message he has received and get an O. K. from ground to assure

(d) In experimenting with D-R system officers with 15 or 20 minutes instructions have been able to read messages at rate of one word per minute which rate can easily be worked up to five words per minute with a little practice in sending and receiving.

(e) It is believed that this system can be used to good advantage where two way radio or telephone is not available or until some better system is advised.

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Overall height8 Ft. 1 in.
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Stagger
Incidence
Rudder area
Fin area
Stabilizer area
Elevators (2) area each
Wing section R A F
Engine
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Speed

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Maximum s	speed 24	H.P		70	M.P	.H.
	18	H.P		60	M.P	H.
Minimum s	peed			30	M.P	.H.
		3	35 H.P.		820	Ft.
Maximum	Climbing	Speed 2	24 H.P.		530	Ft.
			8 H.P.			
Min. H.P. re	eguired fo	r horoz.	flight		6 H	I.P.
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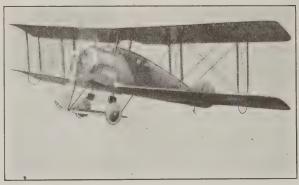
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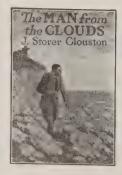
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(Continued from page 760)

aircraft used by any one entrant are identified with one firm of aircraft constructors.

- (c) The entrant must declare what types of aircraft will be used by him, and the Royal Aero Club, whose decision shall be final, shall decide whether such aircraft are in conformity with clause (b) hereof.
- (d) The term "aircraft" for the purposes of this competition includes aeroplanes, seaplanes and airships.
- 7. (a) The crew must not be changed during the competition.
  - (b) More than one member of the crew may be a pilot and act as such if required.
  - (c) Names of the crew must be given to the Royal Aero Club not less than 14 days prior to the start.
- 8. The selection and provision of the cargo of 1,200 pounds are left to the entrant. No alteration in the outward or homeward cargo is permitted en route.
- 9. The start from and arrival back in Great Britain must be at air station licensed for foreign travel.
  - 10. Karachi is the control and turning point in India.
- 11. On the outward journey the time will be taken from the moment of leaving the land or water at an air station in Great Britain licensed for foreign travel until the arrival on land or water at Karachi, India. On the homeward journey the time will be taken from the moment of leaving land or water at Karachi until the arrival on land or water in Great Britain at an air station licensed for foreign travel.
- 12. The start from Great Britain and from Karachi must be made under the supervision of officials appointed by the Royal Aero Club.
- 13. Competitors must conform to the convention relating to International Air Navigation.
- 14. The entry fee is £100. This fee, together with the entry form, must be received by the Royal Aero Club, 3 Clifford Street, London, W. I., at least fourteen days before the start.

### General

- 1. A competitor, by entering, thereby agrees that he is bound by the Regulations herein contained or to be hereafter issued in connection with this competition.
- 2. The last interpretation of these regulations or of any to be hereafter issued shall rest entirely with the Royal Aero Club.
- 3. The competitor shall be solely responsible to the officials for the due observance of these regulations, and shall be the person with whom the officials will deal in respect thereof, or of any other question arising out of this competition.
- 4. A competitor, by entering, waives any right of action against the Royal Aero Club or the proprietors of the Daily Express for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or the proprietors of the Daily Express or their representatives or servants or any fellow competitor.
- 5. The aircraft shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself, or his passenger, or his passengers, or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club and the proprietors of the Daily Express in respect thereof.
- 6. The Committee of the Royal Aero Club reserves to itself the right, with the consent of the proprietors of the Daily Express, to add to, amend or omit any of these rules should it think fit.

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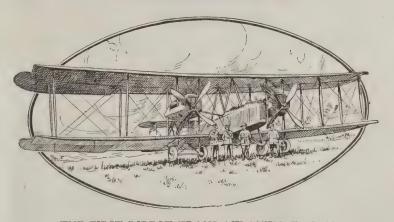
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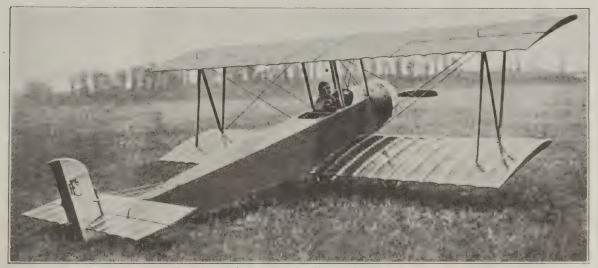
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VOL. X

MARCH 8, 1920

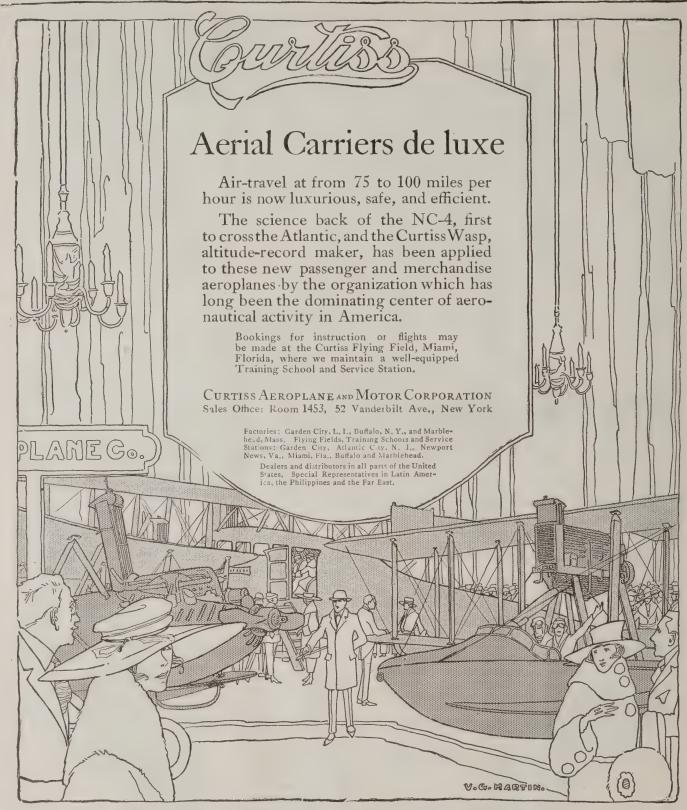
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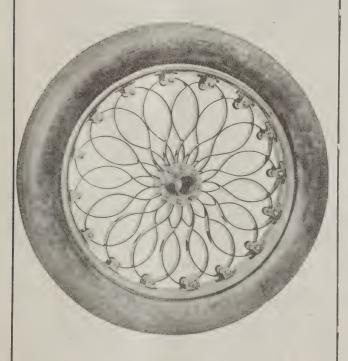
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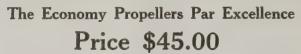
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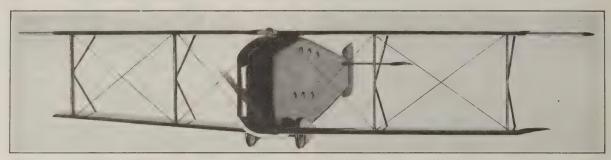


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